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ABSTRACT

This guide provides background information and youth activities for youth leaders and classroom teachers interested in integrating waste management issues into current educational programming. Five parts suggest ideas for action that youth can take at home, in their group, or in the community to solve waste management problems. Part 1 introduces young people to six waste management issues: waste source reduction, reuse, recycling, composting, incineration, and landfilling. Part 2 presents 12 activities for use in class and at home that address the six issues discussed in Part 1. Each activity includes preparation facts, steps on implementing the activity, questions that stimulate participant reflection, and ideas on taking action at home, within the group, and in the community. Part 3 focuses on actions children can take to solve solid waste problems. The actions are separated into three categories and include: (1) 14 actions for groups; (2) over 100 actions to reduce, reuse, and recycle waste for projects related to animal sciences, expressive arts, home economics, mechanical sciences, natural resources, personal growth and development, and plant sciences; and (3) 56 community service ideas. Part 4, a resources section, lists major organizational affiliation; resource people; curriculum, posters and games; periodicals; books; and audio visual materials. Part 5 provides a glossary of 29 terms. (MDH)

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About This Guide

This guide was developed by the Minnesota Extension Service's Waste Management and Water Quality staff and the 4-H Youth Development staff.

Purpose of the Guide:

1. To provide background information and youth activities on solid waste.
2. To provide ideas for integrating waste management issues into all areas of youth programming.
3. To provide ideas for action that youth can take at home, in their group, or in the community to solve waste management problems.

Intended Audience:

Any youth leader or educator interested in integrating waste management issues into current educational programming.

Role of Leader:

You **DO NOT** need to be a waste management expert to use this guide. Your most important role is to serve as a model. The guide suggests ways to reduce waste. Try to make these changes in your own life. Young people will learn more from what you do than from what you say.

Credits:

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Goals of the Guide:

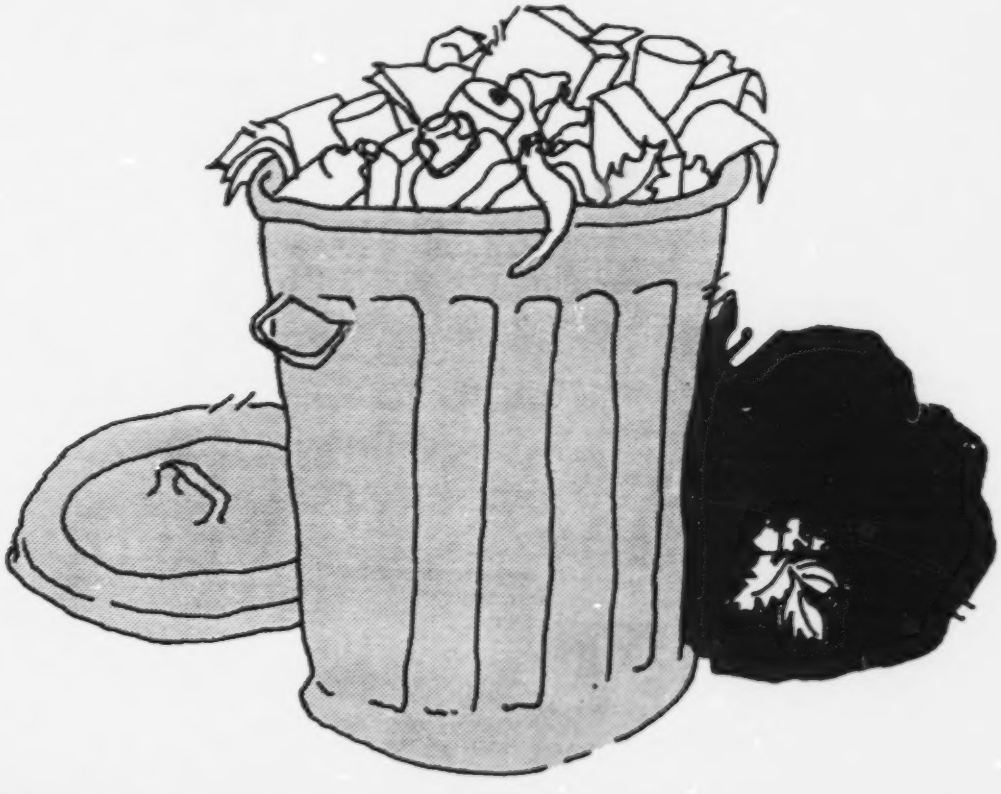
Awareness... to Action!

The guide begins with...

Awareness of our solid waste problem, and how our attitudes and actions affect it,

and leads to...

Action young people can take, individually and in their communities, to solve our waste management problem.



Part I: Introduction to the Waste Issue

Note: This introduction will help you prepare for working with young people and discussing waste management issues. You may wish to use some of the information in your activities or reproduce parts of it for interested youth.

Waste...Or Wasted Resources?

Every Minnesotan throws out about 5.5 pounds of trash every day. That's more than one ton per year! Altogether, Minnesotans produce more than 4.4 million tons of solid waste a year. That's a lot of waste! Or should we say wasted *resources*.

If you don't think you throw away 5.5 pounds of waste a day, add it up: the waste you generate by eating two or three times per day (at home or in a restaurant), going to school, working, or playing.

Look in your garbage can. What do you see?

- ☐ old newspapers
- ☐ soup cans
- ☐ plastic bottles
- ☐ empty cereal boxes

You may call this waste, because you don't want it anymore. But it could be a resource that has value to someone else, or to society. Not using these materials is the real waste. If used wisely, waste could become one of Minnesota's greatest resources!

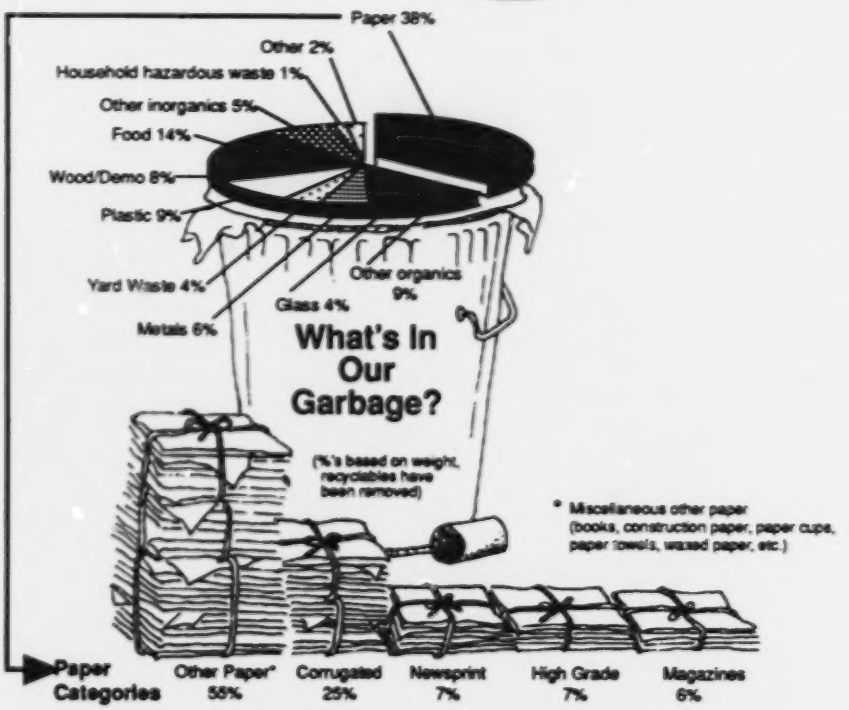
In recent years many Minnesotans have begun to change their waste habits. We are recycling more and becoming more aware of what we buy. We still have a long way to go to have a big impact on waste. But we can do it.

What's in our Garbage?

More than one-third of our garbage is paper. Food waste, glass, metal (both tin and aluminum), and plastic make up most of the rest. Almost 40% of this waste is packaging.

A "River" of Waste

Picture a stream of waste flowing from your home through your garbage can. Now add the waste streams from schools, businesses,



restaurants, government buildings, industries, medical facilities, and construction or demolition sites. All these streams create a huge "river" of garbage that must eventually flow into Minnesota's waste disposal facilities. Each of us plays an important role in reducing this river of waste.

Renewable versus Nonrenewable?

All of our waste materials began as a natural resource. Those resources were either **renewable** or **nonrenewable.**

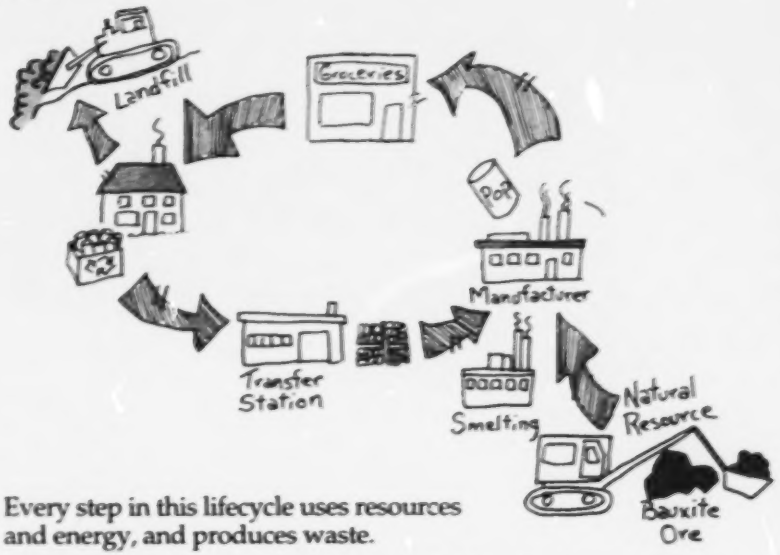
Renewable resources, like wood or cotton, can be replenished over and over. But renewing them takes energy and produces pollution. Sometimes we use renewable resources faster than we can replenish them (i.e., trees in a tropical rain forest).

Nonrenewable resources, like metals or petroleum (used to make plastics), can never be replenished once used. They, too, take energy and produce pollution when they are used.

Yet we bury renewable and nonrenewable resources in landfills every day. Our natural resources are not unlimited. They should be used carefully.

Lifecycle of a Product—A Source of Waste?

Every product and its packaging has a lifecycle, beginning with a natural resource and ending with a disposable waste. Here is the lifecycle of a pop can:



1. Every step in this lifecycle uses resources and energy, and produces waste.
2. Throwing the can into a landfill ends its lifecycle. A new can must then be made from new natural resources.
3. When we recycle the can, the lifecycle continues. Recycling the old product into a new one produces some waste and pollution, but usually not as much as using new natural resources.
4. By reducing the number of products we buy, by recycling, or by buying recycled products, we can eliminate entire lifecycles or prolong lifecycles. This saves resources and energy, and reduces waste.

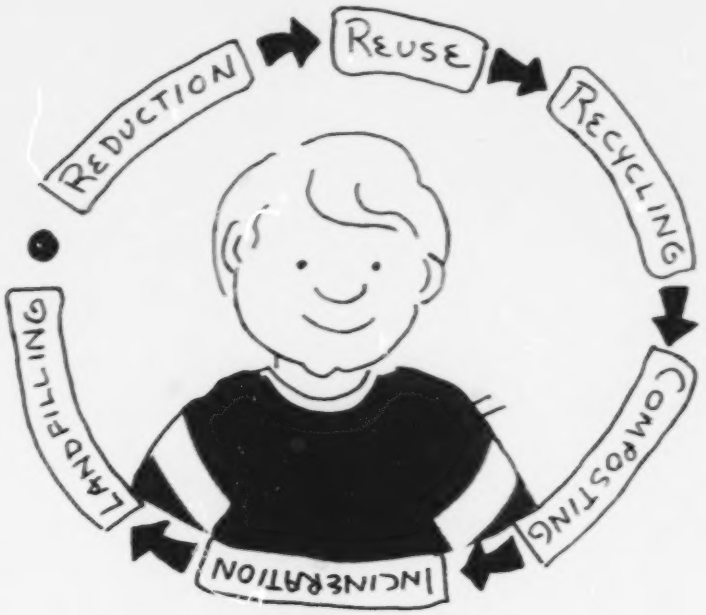
Doesn't Waste Disappear?

Sometimes we think if we burn our waste in an incinerator or bury it in a landfill, it will just disappear. Just because it is out of sight, doesn't mean it doesn't exist. No material on Earth can ever be created or destroyed. Only its form or location can be changed.

Waste Solutions...What are the Choices?

Solving our waste problem involves choices. We choose what we buy, how we buy, and how we use and dispose of a product. Our personal choices make a big difference.

Let's describe those choices a little further.



1. Waste Source Reduction

Deciding whether or not to buy a product is your first choice. It's a decision you can make even before you go to the store. Why are you buying a product? Could you use something else instead? If you don't buy, you create no waste. If you do buy, choose products that will produce the least amount of waste.

Here are some ways to reduce the amount of waste you produce:

- ❑ Buy quality products that last longer.
- ❑ Avoid disposable products.
- ❑ Buy reusable products and containers.
- ❑ Avoid wasteful packaging. Buy in bulk.

Packaging is important because it:

- ❑ keeps the product clean and safe
- ❑ reduces food waste
- ❑ provides information
- ❑ helps in transportation

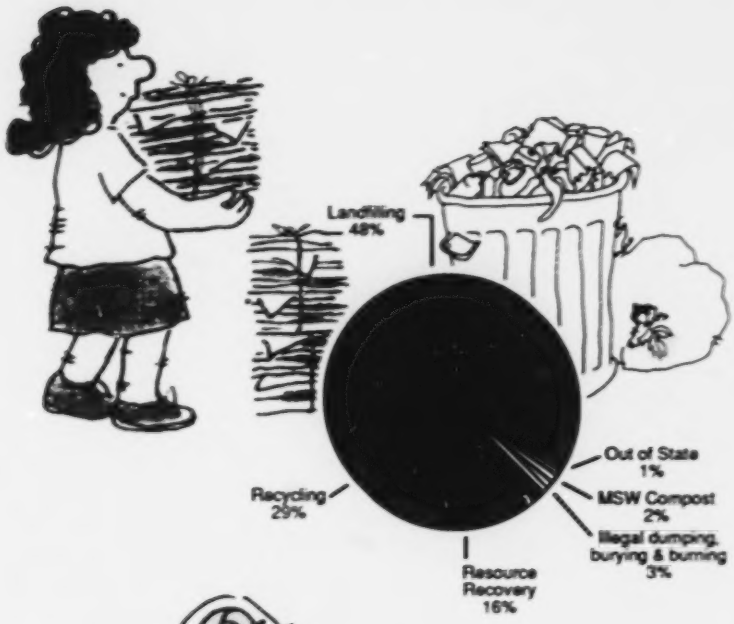
But packaging often adds to our solid waste problem. It also costs you money (almost $1 out of every $11 purchase). Buying in bulk helps reduce this waste, but be careful to buy only what you can use. Buying too much can result in waste too.

2. Reuse

Once you've used a product, could you use it for anything else? You could reuse an old plastic milk jug to make a bird feeder or donate clothing to Goodwill. Reuse scrap lumber in a group project. Reusing reduces waste, eliminates the need for more resources, and makes maximum use of a product.

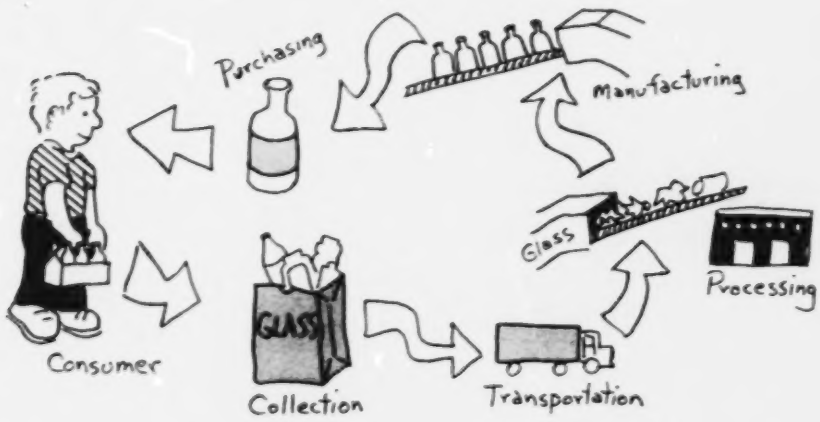
Even if you have reduced the source of your waste and reused products, some things will eventually have to be thrown away. You have several choices in disposing of something you consider waste. Some choices are better than others.

Where does our waste go?



3. Recycling

The recycling process breaks down a product to its original resource, then makes a new product from the resource. Recycling is different from reusing. A reused product remains in its same form.



Recycling:

- ☐ takes energy
- ☐ uses natural resources
- ☐ creates pollution

but not as much as creating the same product from raw materials.

1. Placing your recyclables at the curb or drop-off box is not really recycling; it is the first step in the recycling process.
2. After collection, your recyclables are transported to a recycling center, sometimes called a "materials recovery facility" (MRF, pronounced "murf").
3. At the MRF or recycling center, materials are processed into a form that can be sold to manufacturers:
   - ☐ glass—crushed into small pieces
   - ☐ aluminum/steel cans—separated, crushed and baled
   - ☐ newspaper—baled
   - ☐ plastics—crushed and baled or chipped into small pieces
4. Recycled materials may be used within Minnesota or sent to other parts of the country or Canada to be made into new products.

Some recycled materials, like glass bottles, are remade into the same original product. But about 60% of each remade glass bottle is new raw material.

Some recycled materials, like plastic bottles, may be made into other products like park benches or insulation. In this case, new raw materials are needed to make more plastic bottles. Even this kind of recycling is beneficial because it reduces the need for natural resources to make these new products.

5. We can play an important role in the recycling process by buying products made from recycled materials. When there is demand for these products, manufacturers continue to want our recyclables.

Statewide, Minnesotans now recycle almost 29% of our waste. By 1996, we hope to recycle 45% of our waste in the Twin Cities, and 30% in Greater Minnesota. We can all work together to reach that goal!

4. Composting

Some wastes that are not recyclable can be composted. These wastes include many organic materials:

- ☐ yard waste (grass, leaves, and trimmings)
- ☐ food scraps
- ☐ wood

In composting, microorganisms break down these materials and turn them into a soil-like material called humus.

Like all living things, these microorganisms need adequate amounts of oxygen, water, carbon and nitrogen to work effectively. As they break down, they give off...

- ☐ carbon dioxide
- ☐ water vapor
- ☐ heat

...and that reduces the volume of compost material. It usually takes six to twelve months for the microorganisms to decompose the organic material to form humus. It takes less time when compost is put in piles.

Before 1990, yard waste made up almost 20% of the waste in Minnesota's landfills. Today, yard waste is banned from landfills, and much of it is being composted in backyard or community compost sites or directly soil incorporated.

Composting household garbage or municipal solid waste (MSW) is a new technology in the United States. Minnesota is a national leader, processing 1% to 2% of its garbage at MSW compost facilities.

In MSW composting:

1. Noncompostables (plastic and metals) are removed from garbage for recycling and disposal.
2. Compostable material is placed in piles or enclosed vessels where it is monitored and regularly turned to increase decomposition.

Some possible uses for MSW compost include:

- ☐ greenhouses
- ☐ golf courses
- ☐ highway improvement projects
- ☐ agriculture

Finding new markets for MSW compost will make it a more preferable disposal method.

5. Incineration

Even with recycling and composting, some waste must be managed in a different way. Incineration is the best current alternative to recover energy contained in the waste.

The energy released when garbage is burned can produce electricity or steam for heating. The gases and smoke from burning are emitted into the air after passing through air filters and scrubbers. The ash is taken to special sections of landfills or separate landfills called monofills. Almost 16% of Minnesota's garbage is now incinerated.

There are two kinds of waste-to-energy incineration:

1. Mass burn facilities burn unprocessed garbage. Most incinerated garbage in Minnesota is processed at mass burn facilities.
2. Refuse-derived fuel (RDF) facilities, where garbage is sorted, nonburnables are removed, and the remaining wastes are shredded and burned or formed into pellets. Of the garbage processed at an RDF plant,

   70% is made into fuel
   10% is recycled
   20% is landfilled

The garbage is burned separately or with other fuels (i.e., wood or coal). Most Minnesota RDF plants are in the Twin Cities area.

The pluses of incineration:

- ❑ reduces the volume of garbage going to landfills
- ❑ generates or recaptures energy
- ❑ destroys toxic household chemicals which are harmful in landfills

Minuses of incineration:

- ❑ causes air pollution
- ❑ concentrates heavy metals in the ash
- ❑ can be expensive to build
- ❑ concerns over health effects

While it is not the only disposal alternative, incineration can be an important part of an overall waste management plan.

6. Landfilling

After all other choices are made, some waste must go to a landfill to protect the environment and human health. But permitted landfill space is scarce.

A few years ago, most Minnesota garbage was put in landfills. But in 1990 alone, 40 landfills closed, leaving 52 open landfills. These will also be filled by the mid-1990's. About 48% of our solid waste (including demolition and industrial waste) still goes to landfills, but building new landfills is difficult, expensive, and time consuming.

Landfills are different from open dumps. They are specially designed and operated.

1. The landfill has a thick clay and/or synthetic liner, to stop any liquid material (leachate) from leaking into the groundwater.
2. Leachate is collected in pipes and treated to remove any toxic materials before being discharged.
3. Methane, a potentially dangerous gas given off by decomposing garbage, is also removed by collection pipes, treated, and sometimes used as a fuel source.
4. The garbage is compacted and pressed into small compartments within the landfill.
5. Soil or other cover material is placed over the garbage daily to compress the garbage and virtually eliminate oxygen, so very little decomposition occurs.

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Digging in old landfills has uncovered 25-year-old newspapers that are still readable, and 18-year-old corn on the cob that looks like it was thrown away recently.

How long garbage remains in a landfill is unknown, but 100 years from now people may actually mine our landfills for resources that we have thrown away.

Landfills are now a necessary part of waste management. They are better than

- ❑ litter
- ❑ dumps
- ❑ open burning

We need to protect the space available in them until we develop better options.

Each waste management option has costs and benefits. Before a community selects an option, it should consider health, safety, environment (noise, odors), costs, energy use, and transportation.

Waste...A Matter of Personal Choices

Managing Minnesota's waste involves many personal choices. It is difficult to change our buying habits, and to take responsibility for the waste we produce. But we must.

We can choose to:

- ❑ not buy
- ❑ use again
- ❑ dispose wisely
- ❑ buy
- ❑ not use again
- ❑ dispose unwisely

We can learn to be more responsible for the type and amount of solid waste we produce. It won't always be easy, but we can do it. Everyone's everyday actions directly affect our solid waste problem, and it's a problem we can't ignore.

This guide will help you help young people examine their waste choices, ask good questions, and make wise decisions. You can begin right now with your group's current activities. Encouraging a change in habits and attitudes is part of the solution to reducing waste.

Encourage youth to share what they learn—knowledge, attitudes and habits—at home, in school, in your community. Every one of us can make a difference!

Part II: Introduction to Activities

Through these activities, participants will:

1. Identify waste management problems and solutions.
2. Learn how their actions and attitudes affect the problems and the solutions.

Your task is to guide young people through the experiences. You do not have to be an expert on solid waste issues. The activities are presented in a easy-to-follow format that uses a learn-by-doing style. This whole process, called experiential education, is represented by the following cycle.

In each activity, you'll do an **Experience,** and have people **Share** what they did. Then you'll ask questions (Reflection) to **Process** and verbalize what they learned. Next, you'll help them **Generalize** the learning experience to the world. Finally you'll guide them to **Apply** new knowledge and skills to their lives.

The activities are designed for young people, age 9-12, but you can adapt them for younger and older youth. You do not need to do all the activities nor do them in any particular order. They are listed in order based on the hierarchy of waste choices (i.e., reduction, reuse).

Each activity has the following format:

Preparation:

Fun Fact: Interesting fact to present. Did you know...?

Key concepts: Key ideas presented in the activity.

Objective: What each participant should learn.

Method: Processes used to teach the activity.

Kids this age: Teaching tip for working with children age 9-12.

Time: Estimated time needed to complete activity.

Materials: All the materials you'll need.

Experience: What to do, step by step. Get young people involved in the activity as soon as possible. Let them discover along the way. Use the Reflection section to talk about the concepts in more detail.

Reflection: Important questions to ask participants after the experience. Relates what was learned to each person's own actions.

Taking action: Ways to put learning to work at home, in your group, and in the community.

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Where is Away?

Preparation:

Fun fact: The United States has 6% of the world's population, but produces 50% of the world's garbage.*

Key concepts:

Solid waste can go many places after it is thrown away. Waste should be reduced or reused, if possible.

Objectives:

1. Learn what happens to waste after it leaves your home.
2. Learn the different options for handling waste.

Method:

Active discussion to follow the path of garbage, and to determine what to do with waste.

Kids this age: learn best when they can *see* something. Use props and pictures (i.e., boxes with a truck and recycling center drawn on them) to tell this story.

Time: 30 minutes

Materials:

A trash can, waste materials, a toy truck or wagon, five boxes, notecards, and tape.

Experience:

1. Begin the activity with a few questions:

   What have you thrown away today?

   Where did you throw it away?

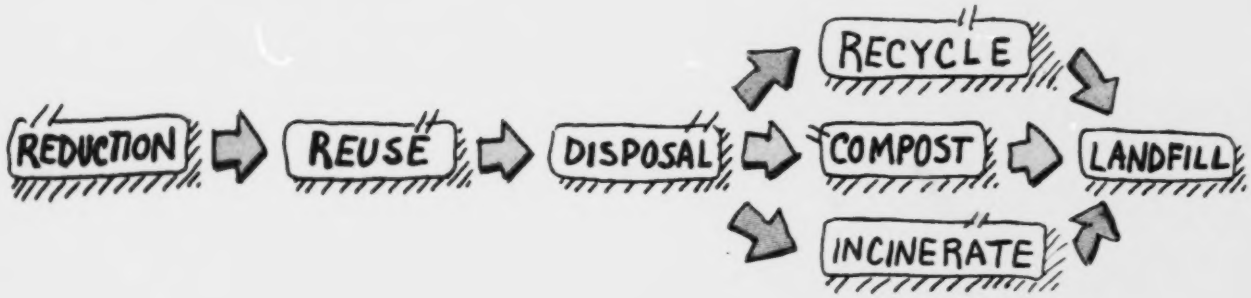
   What happens to waste after it leaves your house?

   After it leaves your school?

2. Place the trash can on a table or desk. (You may want to empty the waste on the floor to get a good look).
3. Ask: What happens once trash is placed at the curb? (Answer: collection and hauling).
4. Take some of the trash from the can and place it on the truck or wagon.

* *Source: "Trash Goes to School," Cornell University Waste Management Institute.*

5. Ask: Where does the truck go? (Answer: Several places may be correct, depending upon the community; one stop may be a "transfer station" where the waste is transferred from smaller collection trucks to a larger truck.) Why would communities do this? (It is cheaper and requires fewer people).
6. Put some of the waste in a box and label it "transfer station."
7. Ask: Where else might the truck go? (Answer: a Materials Recovery Facility (MRF), or Recycling Center, where materials are separated for recycling. After sorting, they are put into larger trucks to be taken to a buyer.)
8. Put some waste from the truck into another box labeled "MRF" or "Recycling Center."
9. Where else might waste go? And where does waste from the transfer station go? (Answer: a landfill, compost facility or incinerator). Put the remaining waste from the truck into boxes labeled with these words.
10. Waste management is very expensive. What could lower its cost? (Answer: produce less waste). How do we do this? (Answer: reduce and reuse).
11. When we reduce, we avoid purchasing materials that will generate waste. Put the word "reduction" on a notecard, and tape it on a wall. Give examples of reduction (see guide Introduction section for ideas).
12. When we reuse an item, we eliminate the need to purchase another item. But eventually, the item will be thrown away. Put the word "reuse" on a notecard, and tape it on the wall next to "reduction." Place an arrow as shown in the illustration. Give examples of reuse.
13. At some point, the items we purchase are no longer wanted. What do we do with them? (Answer: We dispose of them). Put an arrow across from "reuse" and next to the arrow put a notecard with the word "disposal" written on it.
14. What are the options for disposal of used items? (Answers: recycling, composting, and incinerating). Write these three words on separate notecards, and place them in a line on the wall next to "disposal," with arrows pointing to each.
15. Some things cannot be burned, composted, or recycled, so waste is generated when we do these processes. What do we do with all this waste? (Answer: landfill). Put arrows from each of the three options pointing toward a notecard with the word "landfill" written on it.
16. We should make decisions about waste in this order: (1) reduce, (2) reuse, (3) recycle, (4) compost, (5) incinerate, (6) landfill.



Reflection:

1. Where does waste go after it leaves your home? If you recycle, where do your recyclables go?
2. Were you surprised to learn how many steps garbage must go through before it is thrown away?
3. What do you most often do with your garbage? Do you reduce, reuse, and finally dispose of it, or does most of your waste go to a landfill?

Taking action:

At home

Put the diagram for disposal options on your refrigerator. Consult the diagram before you throw anything out. Can you think of ways you could reduce, reuse, or recycle a piece of garbage? Was there a better product or package choice that would have allowed you to reduce, reuse, or recycle it?

With our group

Discuss ways that you could reduce, reuse, or recycle your group's garbage (see suggestions in the Action section of the guide). Implement those ideas.

In our community

Write letters to your local garbage haulers and recycling companies. Find out where your garbage goes. Set up a tour of your local MRF, recycling center, or transfer station.

Adapted with permission from: "Waste Wise: Concepts in Waste Management," The Ohio State University, Columbus, Ohio.

Working on Waste: 4-H Efforts in Swift County, Minnesota

"If you educate the children, they in turn will educate their parents." Randee Hokanson, Swift County 4-H Agent.

Swift County has been actively educating its communities on waste issues for more than five years, and 4-H clubs have played a big role. "Wastebusters," teams of adult and youth volunteers, have presented weeklong educational programs on the 3 Rs to children in grades K-12. They also produced a 12-minute video to educate county residents on how to sort their waste for collection. The video starred a 4-H youth Wastebuster.

4-H clubs also have sponsored paint swaps to collect unused paint and redistribute it to individuals, school drama departments, etc. They have distributed more than 2,000 recycling bins to area residents, developed waste education brochures, and sponsored newspaper recycling drives.

Garbology Game

Preparation:

Fun fact: Recycling one ton of paper saves about 17 trees.*

Key concepts:

Products are made from either renewable or nonrenewable resources. We can preserve resources by reducing waste.

Objectives:

1. Learn some basic garbage facts.
2. Discover that learning about garbage can be fun!

Method:

Compete in a game on garbage to learn about waste.

Kids this age: learn best by doing, not by listening. Use an active game to teach the facts about garbage.

Time: 30 minutes (additional time if making name tags and/or logos)

Materials:

Paper, pencils, paper bags, bathroom scale, garbage bag, and garbage.

Experience:

1. Explain: Everyone will compete in teams to learn the facts about garbage and why it is such a big problem.
2. Divide the group into teams of three or four. Have each team give itself a name that relates to fighting garbage. (Examples: Recyclomaniacs, Waste Busters, or Earth Protectors).
3. Optional: Have each team design a team logo and nametags, reusing items that usually are thrown away (i.e., straws, birthday cards).
4. Tell the teams they will be competing for points by playing several games. The team with the most points at the end of the event will be garbology champions.

Source: "Re: Thinking Recycling," An Oregon Waste Reduction Curriculum

Game # 1: Natural recycling challenge:

a. Give each team a piece of paper and a pencil.

b. Allow each group five minutes to list ways that nature recycles things. (Examples: a fallen tree becomes soil, grass becomes bird nest material, ocean water becomes rain).

c. Have each team read its list. The group with the most examples receives five points.

d. The team with the most *creative* example receives three points (based on the leader's judgment).

Explain: In the natural world everything is used over and over. Waste is a human idea.

Game # 2: Renewable relay:

a. Explain: Everything we buy and use comes from natural resources. Resources that can be replaced if used are "renewable" (i.e., wood or cotton). Those that can never be replaced are "nonrenewable" (i.e., metals or petroleum).

b. Ask: What are some examples of both?

c. Line up the teams in rows.

d. Across the room, place one paper bag for each team containing pieces of paper with these words: glass vase, plastic cup, steak, book, aluminum can, cardboard box, cotton shirt, and steel bucket. (Optional: use the actual objects).

e. Each member of the team (one at a time) runs to the bag, takes out an item, runs back, and places the item in one of two piles, renewable or nonrenewable resource, depending on what they think it is made of.

f. Give each group a slip of paper or a plastic chip for each correct choice. Each team receives one point for each correct answer.

g. If there is a tie, the team that finished first receives 2 additional points. (Answers: Renewable—steak, book, cardboard box, cotton shirt; nonrenewable—glass vase, plastic cup, aluminum can, steel bucket).

Explain: we help preserve limited resources by reducing the waste we throw away.

Game #3: What's in our garbage challenge:

a. Give each team a piece of paper and a pencil.

b. Have each team rank items in order, based on this question: If we emptied a typical garbage can, which material would we find the most of, and which would we find the least of?

c. Rank in order from most to least. (Answer: paper (38%), metal (14%), plastic (8%), food waste (4%), and glass (2%).

d. Each team gets one point for each correct ranking.

Game # 4: How much do you throw away challenge:

a. Ask each team to guess how much garbage their team as a whole throws away each day.

b. Have a person stand on a bathroom scale. Write down their weight.

c. Hand them a garbage bag, and begin to fill it with garbage.

d. Continue adding until you have added 25 pounds of garbage to the bag (the average person throws away 5.5 pounds/day, or 24 pounds/day for a team of four).

e. The team that comes closest to the correct amount receives 5 points.

How much garbage would your whole group throw away? your whole city? the whole state?

5. Total up each team's points. The team with the most total points is the garbology champion.
6. You might give recyclable prizes, but tell the group they are all winners and future garbologists in their own right.

Reflection:

1. Ask each person to list one thing they learned from playing the games.
2. Why is garbage a problem?
3. What can we do about it?

Taking action:

At home

Develop your own garbage game and share it with your friends and family. What facts would be important to teach people through your game?

With our group

Plan a waste management festival, including games, presentations, and exhibits. Be sure to provide ways for people to reduce, reuse, and recycle at the event.

In our community

We learn many wasteful habits from watching television. Watch a TV show and identify things that could be done to reduce waste. What would an environmental television game show be like?

Working on Waste: 4-H Efforts in Isanti County, Minnesota

Isanti County 4-H'ers sing and dance the waste message. Arts-In, a grade 7-12 4-H theatrical group, performed a waste education play called "It's Our World" during the summer of 1991. The group performed the show at local fairs, schools, and teacher workshops; at the Minnesota State Fair; and on television and radio. A videotape of the play is being used in local schools.

High school 4-H members are reaching children grades K-6 with the 3 Rs message through Teen Peer Teaching programs.

Some Isanti County clubs have chosen recycling as their club theme. They have developed and distributed community brochures on recycling, maintained local recycling sheds, and incorporated waste issues into club speaker presentations. They also worked with the county highway engineer to set up "Adopt a Highway" cleanup programs on their county highways, since all the state highways now are "adopted" through this program.

Planning the Perfect Package

Preparation:

Fun fact: Approximately forty percent of our garbage is made up of packaging.*

Key concepts:

Increased amounts of garbage is partly due to increased packaging. Packaging is important. Finding ways to reduce packaging is also important.

Objectives:

1. Learn the benefits and problems of packaging.
2. Describe creative packaging alternatives that would reduce waste.

Method:

Create packages from scrap materials that are good for the product, yet create a minimum of waste.

Time: 30-40 minutes

Materials:

Paper, pencils, colored markers or crayons, scissors, tape or glue, two oranges, wrapping material, medicine (loose aspirin or throat lozenges), food (pieces of candy or cookies), and toys (small car, ball and jacks, etc.).

Experience:

1. Begin the activity with a few questions-

   What is packaging?

   Why do we put products in packaging?

   What do we do with packaging after we've used the product?

2. Explain: Packaging is important. We use packaging to:

   - ☐ Protect products
   - ☐ Protect the environment
   - ☐ Prevent theft
   - ☐ Make transportation easier
   - ☐ Help sell or market a product
   - ☐ Provide information

* Source: "Trash Goes to School," Cornell University Waste Management Institute.

3. Show the group two oranges, one attractively wrapped in clear plastic in a box with a ribbon, the other without wrapping (you could also show several other orange products—i.e., orange juice cartons).
4. Ask: Which orange is packaged? Point out the natural packaging of the unwrapped orange. Is all that other packaging necessary?
5. Explain: Many products we buy are excessively packaged. What happens to the packaging when the product is used up?
6. Explain: Some packaging harms the environment (Example: some nonrecyclable packaging ends up in a landfill; some paints in packaging are toxic; packaging uses up natural resources). How could you design a package to reduce this environmental harm?
7. Divide people into three groups. Explain: They will be trying to design packages that produce the least amount of waste. Members may work individually or as a group.
   a. Give the first group one of the medicines, and explain that the package must be safe and must include instructions for use.
   b. Give the second group one of the food items. This package must be safe and clean, and make people want to buy the food.
   c. Give the third group one of the toy items. This package must not be easily stolen, and must be conveniently stored and transported.
8. Hand out construction materials. Give each person 20-30 minutes to design his or her package. It can be drawn, colored, cut, or glued. Encourage creativity and unique solutions.
9. Have each person present his or her package to the whole group and describe its positive features.
10. Give each child a special package award. (Example: Most creative medicine package, least amount of waste in a toy package, safest food package, etc.) Try to find treats or awards that produce little waste.

Reflection:

Discuss the following with the group:

1. Was it difficult to design a package that was good for the product, but produced little waste?
2. Who do you think makes decisions about how products are packaged? Can the person who buys a product influence how it is packaged?
3. Of the different packaging materials available today (plastic, paper, glass, metal), which impacts the environment the least? The most? Why?
4. Who do you think pays for excess packaging? (Answer: the consumer; for every $11 spent on a product, about $1 is for the packaging).
5. Besides not buying products that are excessively packaged, how else could we reduce the amount of packaging that ends up in the garbage? (Answer: reuse or recycle it).

Taking action:

At home

Conduct a "packaging audit" of your home. Are there products that could have been bought in less packaging, or recyclable packaging? Could products be purchased in bulk or larger volume? Could you help your parents choose packaging that is environmentally sound?

In our group

As a group, plan and purchase an environmentally sound picnic with items from a local store, comparing costs and packages of different products. Consider not only food but the types of plates, cups, and utensils. Find a nice place (indoors or outdoors) to enjoy your picnic.

In our community

Make posters describing packaging choices that benefit the environment. Could you do similar displays for a drugstore, garage sale or hardware store? Write letters to companies that package products in excessive or nonrecyclable packaging. As a consumer, can your letters make a difference?

NOTE: *"The Rotten Truth"* is a good video to use with this activity. See the Resource section of this guide.

Working on Waste: 4-H Efforts in Wabasha County, Minnesota

Elgin Rockets, the 4-H club in Elgin, Minnesota (pop. 780) provided active leadership in dealing with waste in their community. For Earth Day 1990, their project was siting a yard waste composting site in their community.

They researched the topic, appeared before the city council and the township board to gain support for their idea, and helped fill out the applications with the Minnesota Pollution Control Agency. The club members, along with local senior citizens, now staff the site twice a month and have developed brochures about the facility.

Roberta Kurth, adult leader of the Elgin Rockets, extols the benefits of community service projects on waste: "Club members have gotten a firsthand experience in how local government works and how community decisions are made," she said.

Reducing Waste—In Any Project

Preparation:

Fun fact: About 100,000 tons of waste a year could be eliminated in Minnesota by practicing waste reduction.*

Key concepts:

Every activity we do creates waste. We can find ways to reduce this waste.

Objectives:

1. Learn to identify inputs, actions, and outputs of a project and describe how they interact.
2. Learn to reduce solid waste in project plans.

Method:

Use example projects to learn ways to reduce waste.

Kids this age: may have difficulty discussing projects they are not familiar with. Allow children to choose a project of interest to them.

Time: 30 minutes

Materials:

Newsprint or whiteboard, markers, scratch paper, and pencils.

Experience:

1. Use one or both of the examples on the next page or choose another project. Write the headings "Inputs," "Actions," and "Outputs" on newsprint or whiteboard.
2. Ask participants to list what they would do (actions) in the Example 1 or Example 2 project in one year. Write the responses under Actions.
3. Ask the group to list what they need to do these actions (inputs). Write the responses under Inputs.
4. Ask the group to list what is produced from these actions (outputs). (Don't forget the wastes produced.) Write the responses under Outputs.

* Source: "Breaking the Landfill Habit" fact sheet, Minnesota Pollution Control Agency.

Example # 1: Clothing project

Inputs	Project Actions	Outputs
sewing machine	Make a shirt	garment
fabric	Do a demonstration about sewing a button	scrap fabric
thread	Exhibit at fair	used pattern
pattern		accessories
accessories		tagboard scraps
poster tagboard		packaging waste
markers		auto exhaust
buttons		markers
transportation (gas)		auto fumes
water to wash fabric		used oil
detergent		wastewater

Example # 2: Dairy science

Inputs	Project Actions	Outputs
animal	Exhibit at fair	healthy animal
water (for washing, drinking, and irrigation)	Do a demonstration about raising a calf	feed bags
feed material		animal waste
animal health products		hazardous wastes from health and sanitation materials
dairy sanitation materials		residue waste (bedding)
equipment—transportation		fuel (tractors, etc.)
bedding		tagboard
tagboard		markers
markers		

5. Ask participants: Which items in the Outputs column are solid waste? How could you reduce this waste? After reducing, could any of these items be reused or recycled?
6. Hand out scratch paper and pencils. Working in pairs, have participants select a project other than the examples given (for example projects, see the Action section of this guide).
7. On the scratch paper, have them write the type of project on the top of the page and the headings Inputs, Actions, and Outputs.
8. Give each pair ten minutes to brainstorm all the inputs, actions, and outputs they can think of for the project.
9. Ask participants to identify all the wastes produced by this project. Give each pair ten minutes to brainstorm what they could do to reduce this waste.
10. What could you do to reuse or recycle some of these outputs?
11. Report back.

Reflection:

1. What did you discover about projects and solid waste from this activity?
2. How could you control the inputs, actions, and outputs in this project?
3. What are some creative things you could do to reduce, reuse, and recycle in this project?
4. What changes will you make or plan this year for your favorite project, to model good environmental habits?

Taking action:

At home

Talk about this activity with your family. Use the model and brainstorm some of the inputs, actions, and outputs for things you do in your home (Examples: buying groceries or taking a trip). See how many things you could change to reduce waste.

With our group

Using this model of inputs, actions, and outputs, evaluate your next group event or activity to identify ways you could reduce, reuse, or recycle the waste produced. Make it your goal to produce as little waste as possible during this activity.

In our community

Make an exhibit that incorporates reused and recycled materials. Be sure to point this out to your audience. Do a demonstration for your group or school showing how there is a solid waste lesson in any project and how you will change a project to reduce waste.

Digging for Garbage Clues

Preparation:

Fun fact: Every person in Minnesota generates about 5.5 pounds of garbage every day.

Key concepts:

One part of the solution to the waste problem is to change our lifestyles. That involves changing some of our habits and values.

Objectives:

1. Learn how garbage reflects individual and societal values.
2. Learn which values, if changed, would help reduce waste.

Method:

Compare the garbage of three communities, and try to decipher the clues it gives about that community.

Kids this age: may have trouble relating the contents of the garbage bags with people's daily activities. Lead with some questions—Describe the person who threw out this garbage, what do they do, etc.

Time: 30 minutes

Materials:

Garbage bag labeled "City A, Minnesota" containing glossy junk mail, a cardboard cereal box, a plastic milk jug, food scraps (dried or in plastic bag), and other non-recyclable or non-reusable items.

Garbage bag labeled "City B, Minnesota" containing the same items as in "City A" bag, plus plastic bottles, disposable products (Examples: soap dispenser, disposable diaper), glass bottles.

Garbage bag labeled "City C, Minnesota" containing the same items as in "City B" bag, plus a newspaper and aluminum cans.

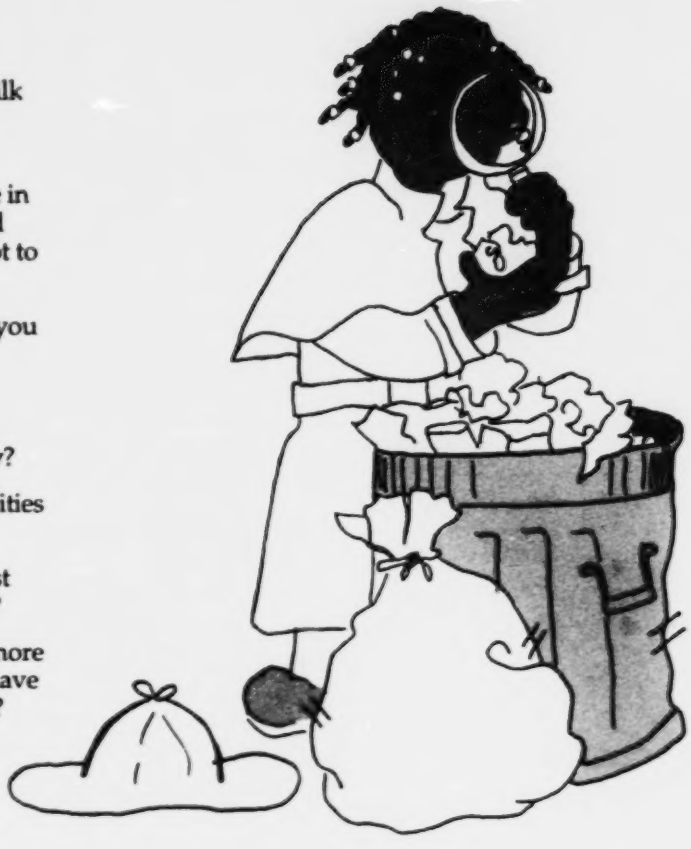
Experience:

1. Explain: Let's imagine we are detectives living 500 years in the future, digging for clues about how people lived on earth in the 1990's. We find a bag of garbage from this year in an old trash barrel in each of three communities. We are going to use the garbage as clues to tell us about the people who lived in these communities. (Note: Each of the communities had similar recycling programs).
2. Divide the participants into three groups. Give each group some scratch paper and pencils.
3. Let each group look at the contents of each bag for about five minutes. Discuss among themselves the contents of each bag, and then write out statements about the people who lived in each community. Have them pay attention to what people consumed and their waste habits or values.
4. After all groups have observed and discussed the three bags, have each small group share its statements.

Reflection:

Discuss the following with the whole group:

1. What were the similarities between cities? (Example: Since all bags contained plastic milk bottles, plastic recycling probably wasn't available).
2. What were the differences? (Example: People in communities B and C ate lots of fast food and processed, packaged food, and they chose not to recycle aluminum cans).
3. By looking at each bag of garbage, what can you say about people's lifestyles?
4. What can you say about their values? How important was it to them to cut down on the amount of garbage they were throwing away?
5. What changes in lifestyle could be made in Cities B and C, to become more like City A?
6. Which of the cities has values and habits most like your community? your family? yourself?
7. What could your community do to become more like City A? How would your own lifestyle have to change? What would you have to give up? Would you be willing to do that?



Taking action:

At home

Ask parents, older relatives, or other adults what kinds of things you would find in their family's garbage when they were your age. What wouldn't you find? Did they create more or less garbage each week than you do now? Discuss how the people living in your home could work together to reduce solid waste.

With your group

Investigate a local grocery store. Dig up clues about the kinds of products people can buy. Can you buy things in bulk? Can you buy products in recyclable or reusable containers? Does the grocer provide opportunities to recycle? Which is better, paper or plastic bags? Can they be reused? What does this "waste audit" of your local grocery store tell you about your community?

In our community

Talk to your local newspaper about a feature story on the changes in solid waste in your community over the last 100 years. Tell what you have learned. Offer to write the article yourself or be interviewed by the paper. Suggest other local people who could be interviewed. Be sure to explain what a community's waste says about its environmental values. Give some suggestions for dealing with solid waste in your community.

What a Difference I Make!

Preparation:

Fun fact: Every year, Americans use over 92 billion metal cans and 42 billion glass bottles and jars.*

Key concepts:

It takes energy and natural resources to make all products. Recycling can cut down on the use of energy and natural resources.

Objectives:

1. Recognize your own impact on the amount of solid waste produced.
2. Recognize the impact of recycling on energy and natural resources.

Method:

Calculate what effects an individual's recycling can have on energy and natural resources.

Kids this age: may have trouble with multiplication and division. You may want to work the problems together as a group.

Time: 30 minutes

Materials:

Scratch paper, pencils, calculators (optional), and recycled or reused paper for writing out statements.

* Source: "Recycling Study Guide," Wisconsin Department of Natural Resources.

Experience:

1. In advance, write out the following fact statements on a piece of scratch paper or copy and cut the cards as illustrated for each group:

Facts About Garbage

a) There are 365 days in a year (except leap year).

b) There are 16 cups in one gallon.

c) Recycling one aluminum can saves the energy equivalent of 1 cup of gasoline.

d) Recycling one aluminum can saves enough energy to light a 100 watt light bulb for 3.5 hours.

e) Recycling one glass bottle saves enough energy to light a 100 watt light bulb for 4 hours.

f) Each person in Minnesota generates about 5.5 pounds of garbage in one day.

Mystery 1:

If I recycle one aluminum can a day for a year, I would save enough energy to light a room with a 100-watt light bulb for how many hours?

Given the number of pop cans you and your family use each week, how many hours could you light the light bulb in one year if they were recycled?

Mystery 2:

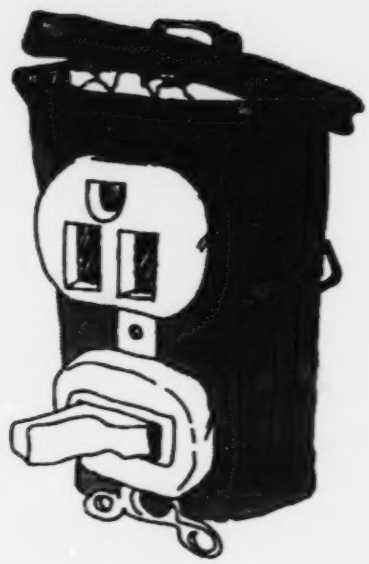
If I recycle ten glass bottles each month, I could light a room with a 100-watt light bulb for how many hours each year?

Given the number of glass bottles and jars you and your family use each week, how many hours could you light the light bulb in one year if they were recycled?

Mystery 3:

This is a toughy! If a car can go 30 miles on one gallon of gas, how far could it travel on the amount of gasoline saved by recycling eight aluminum cans each month for a year?

How many miles could your family's car go, given the number of aluminum cans you use each year?



Answer 1:
365 days X 1 aluminum can/day = 365 aluminum cans
365 aluminum cans X 3.5 hours of light/can = 1,277.5 hours.
That is only one can!

Answer 2:
12 months/year X 10 glass bottles/month = 120 glass bottles
120 glass bottles X 4 hours of light/bottle = 480 hours.
That's a lot of light!

Answer 3:
12 months/year X 8 aluminum cans/month = 96 aluminum cans
96 aluminum cans X 1 cup of gasoline/aluminum can = 96 cups of gasoline
96 cups of gasoline X 1 gallon gasoline/16 cups liquid = 6 gallons of gasoline
6 gallons X 30 miles/1 gallon of gasoline = 180 miles.

2. Begin the activity with a few questions.

   Estimate: How many pop cans do you or your family use each week?

   How many glass bottles or jars?

   What do you do with these items when you are done with them?

3. Explain: some people say environmental problems are so big that one person's actions don't really matter. How do you feel about that statement? Do you think it is true?

4. Explain: each person *can* make a difference. Solving our garbage problem is a good example. Let's figure out how much difference you can make.

5. Divide into groups of 2 or 3. Explain that they are trying to solve waste problems given a set of facts.

6. Hand out to each small group a copy of the fact statements, paper, pencils, and calculators (optional).

7. Do as many of these activities as time permits.

8. Ask each group to report back on their answers. Share the correct answers, if necessary.

Reflection:

Discuss the following with the whole group:

1. Would your efforts, and your family's, to recycle really make a difference? Were you surprised by that?
2. How many people live in your community? If everyone recycled the same amount as you, what would your answers to these problems be?
3. A lot of energy was saved by recycling. Why is that? (Answer: it takes energy to obtain natural resources; recycling replaces natural resources).
4. What other benefits, besides saving energy, do you get from recycling? (Answer: less resources used, lower costs, less waste).
5. What other actions could you take that would really make a difference in reducing waste?

Taking action:

At home

Set up a recycling center in your home. If you already have one, calculate the amount of energy you are saving every time you recycle by using the problems given in this activity. Report your findings to the people in your home.

With our group

Conduct some detective work as a group. Using a local map, phone book, and other sources, try to locate places where different types of recycled materials are collected in your community. Do some areas lack recycling? What could people do about that?

In our community

Create posters that help people see that they can make a difference in recycling. You may also want to create posters showing where people can recycle. Display these posters around your community.

The Great Disappearing Act?

THIS ACTIVITY SHOULD BE DONE WITH ADEQUATE ADULT SUPERVISION. WITH YOUNGER CHILDREN, YOU SHOULD DEMONSTRATE THE ACTIVITY.

Preparation:

Fun fact: You will throw away 600 times your adult weight in garbage in your lifetime.*

Key concepts:

The garbage we produce doesn't go away. It remains in the environment, no matter what we do to it.

Objectives:

1. Learn that changing the form of garbage doesn't alter its total quantity.
2. Learn how to reduce the amount of waste we throw away.

Method:

Through simple experiments, prove that garbage really does not disappear.

Kids this age: may not understand how these concrete experiments relate to larger concepts like landfills and incinerators. Try to explain this relationship (i.e., you just crushed a few cans, a landfill holds thousands of crushed cans).

Time: 45 minutes (if every group does all four experiments)

Materials:

A scale to weigh small increments (postal or kitchen scale), small container for soil, an apple, three tin cans, can opener, pitcher of water, newspaper, matches, nonburnable container, and scratch paper.

* Source: "Re: Thinking Recycling," Oregon Waste Reduction Curriculum.

Experience:

1. Begin the activity with some questions:

   What kinds of things do you throw away each day?

   Where do you think this garbage goes?

   What happens to your garbage then?

2. Explain: Many people think that garbage just "disappears." You will have the chance to prove whether this is true.
3. Divide the whole group into four smaller groups (each group could do all the experiments or just one).
4. Assign each group to an experiment station. Place a situation statement at each station. We are trying to prove whether or not each situation statement is true.
5. Have each group report back what they did and what they discovered.

Station 1:

"If I bury food waste in a landfill, it will go away."

The group at this station should do the following:

a) Weigh a small container of soil. Record its weight.

b) Weigh an apple or pieces of apple. Record the weight.

c) Bury the apple waste in the soil, like waste is buried in a landfill.

d) Weigh the soil container now.

e) How has the weight changed? Has the apple disappeared?

Station 2:

"By changing the shape of a tin can, I can reduce the amount of natural resources I throw away."

The group should do the following:

a) Weigh the cans. Record their weights.

b) With a can opener, cut the tops and bottoms off the cans and carefully flatten them.

c) Now weigh all the can pieces again.

d) Has the weight changed? What has changed? (Answer: the volume or size of the cans).

Station 3:

"If I wash away waste with water, it will go away."

The group should do the following:

a) Weigh a small pitcher or bottle of water. Record its weight.

b) Weigh 1/4 cup of sugar. Record its weight.

c) Add the sugar to the water and stir.

d) Weigh the water now. Has the weight changed?

e) Where did the sugar go? Did you get rid of the sugar? (Taste the water).

Station 4:

"If I burn (incinerate) garbage, it will go away."

The group should do the following (WITH ADULT SUPERVISION):

a) Weigh a small amount of newspaper pieces in a small container.

b) Put the newspaper pieces in a larger non-burnable container and take them outside. VERY CAREFULLY, use a match to light the paper. Observe what happens to the paper and what comes out of the container while it burns.

c) When the ashes have cooled, collect them in the small container and weigh them. Compare the weights.

d) Are the weights different? Why? Where did the other material weight go?

Reflection:

Discuss the following with the whole group:

1. After doing these experiments, what would you say to someone who tells you that "garbage goes away"? What *really* happens to garbage?
2. What "real life" situation is each of these experiments like? (Answer: Situation 1 is like burying food in a landfill—it doesn't disappear; Situation 2 is like compressing garbage in a landfill—it is still the same amount of material; Situation 3 is like flushing household hazardous chemicals down the drain—they don't disappear, they are just diluted; Situation 4 is like incineration—burning doesn't make garbage disappear).
3. Are there benefits in changing the volume or form of a piece of garbage? (Answer: crushing a can saves space in a landfill; dissolving a substance in water reduces its concentration and possibly its harm; burning garbage reduces the volume sent to a landfill).
4. When could these changes have a negative effect on the environment? (Answer: burning toxic substances could emit air pollutants; some substances could pollute water).
5. Since garbage does not go away, how could you reduce the amount of garbage you throw away?

Taking action:

At home

Discuss with a parent or another adult what you learned. Take a look at your family's garbage and determine where three different items will go when they are taken from your home for disposal.

In our community

Do one or more of these experiments as a demonstration for other groups or your school.

NOTE: *"The Rotten Truth"* is a good video to use with this activity. See the Resource section of this guide.

Creative Compost Columns

Preparation:

Fun fact: One-fifth of Minnesota's garbage is yard waste. Yard waste can not be landfilled in Minnesota.*

Key concepts:

Composting is a good way to dispose of yard wastes (leaves and grass), and vegetable food wastes.

Objectives:

1. Learn what composting is and how it is done.
2. Learn why composting is a good way to dispose of some wastes.

Method:

Construct compost columns from used plastic pop bottles and various organic wastes.

Kids this age: may not understand what a microorganism is. If I can't see it, how can it be? Microorganisms are plants and animals that can be seen only under a microscope. In compost, they are mainly bacteria and fungi.

Time: 30-45 minutes (depending on how much you prepare bottles prior to activity)

Materials:

Three 2-liter plastic pop bottles—labels removed, scissors, razor blade, knife, nylon stocking/ mesh material, tape, rubber band, garden soil, vegetable scraps (potato, carrot or fruit peelings), and yard waste (grass clippings and leaves).

Experience:

1. Begin the activity with a few questions:

   What is composting?

   What kinds of things are composted?

2. Explain: Composting is a way to use yard and food wastes, instead of throwing them away. Microorganisms in the soil break down these waste materials. These microorganisms need water, air, and food to live.

3. Cut the top off one bottle and the bottoms off two others. (You may want to do this ahead of time). Give each person or small group a set of three cut plastic bottles.

4. Arrange the bottles into a column. Cut out three or four windows (air holes) in the top two bottles about an inch wide.

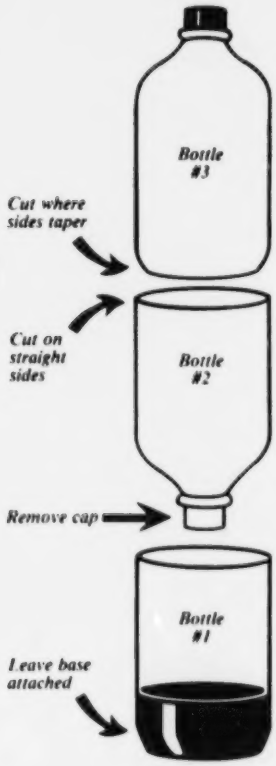
5. Cover the windows with nylon stocking or other mesh material and tape to hold firmly.

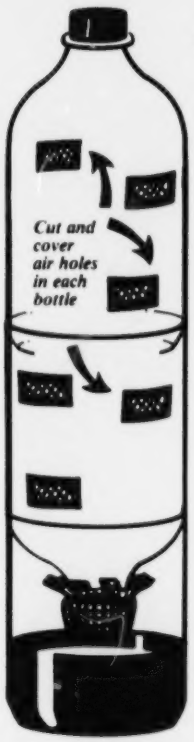
6. Before attaching the middle bottle to the bottom bottle, place a nylon stocking or other mesh material over its opening. Secure it with a rubber band.

7. Fill the middle bottle with soil. Bury vegetable or fruit scraps, grass, and leaves in the soil. Smaller pieces decompose faster. Why? (Answer: more area for the microorganisms to feed on).

* Source: "Breaking the Landfill Habit: Composting," Minnesota Pollution Control Agency.

8. Add water to moisten the soil, allowing a few drops to drain into the bottom of the column.
9. Replace the top bottle, leaving the windows uncovered. Keep soil moist (but not too moist) by recycling the compost water (leachate). Stir the compost periodically. Why? (Answer: gives microorganisms more air).
10. If possible, observe the changes over several months; bring columns to future meetings for comparisons.





Reflection:

Discuss the following with the whole group:

1. What were the key ingredients in our compost columns? (Answer: soil, wastes, water, air). What purpose did each ingredient serve? (Answer: soil—microorganisms; wastes—food; water and air—microorganisms need to live).
2. What other wastes could we compost? (Answer: wood, paper, animal manure). What kinds of wastes couldn't we compost? (Answer: plastic, glass, metal). Why? (Answer: microorganisms can't break these materials down).
3. Why shouldn't you compost meat scraps? (Answer: meat scraps might attract rodents and other pests).
4. What does finished compost look like? What could you do with it? (Answer: mix with garden soil or potting soil).
5. Why is composting important? (Answer: reduces the amount of garbage being thrown away; compost useful to plants).
6. Where do your yard and food wastes go?

Taking action:

At home

Show your compost column to people in your home. Explain how composting works, and why it is important. Start a compost pile in your backyard. Your county Extension Service office may provide information on building bins. Ask for the brochure "Composting and Mulching: A Guide to Managing Organic Yard Wastes," AG-FO-3296.

With our group

Try different experiments with each compost column:

Vary the types of materials composted

Add soil to some columns and not to others

Keep columns at different temperatures

Vary the amount of moisture or air

What differences do you see? How can you explain those differences?

In our community

Investigate where your community's yard waste goes. Do you have a community yard waste composting site? Could you visit that site and talk with the operator? Could your group help publicize or assist at the site?

Trash to Ash

Preparation:

THIS ACTIVITY SHOULD ONLY BE DONE WITH ADEQUATE ADULT SUPERVISION. WITH YOUNGER CHILDREN, YOU SHOULD DEMONSTRATE THE ACTIVITY.

Fun fact: Incinerators burn trash at temperatures between 1,800 and 2,000 degrees F. Aluminum melts at 1,200 degrees F.*

Key concepts:

Incinerators reduce the volume of trash while producing energy. Not all trash is burnable. Incinerator ash must still be landfilled.

Objectives:

1. Observe how incineration reduces wastes and produces emissions.
2. Understand the benefits and problems of incineration.

Method:

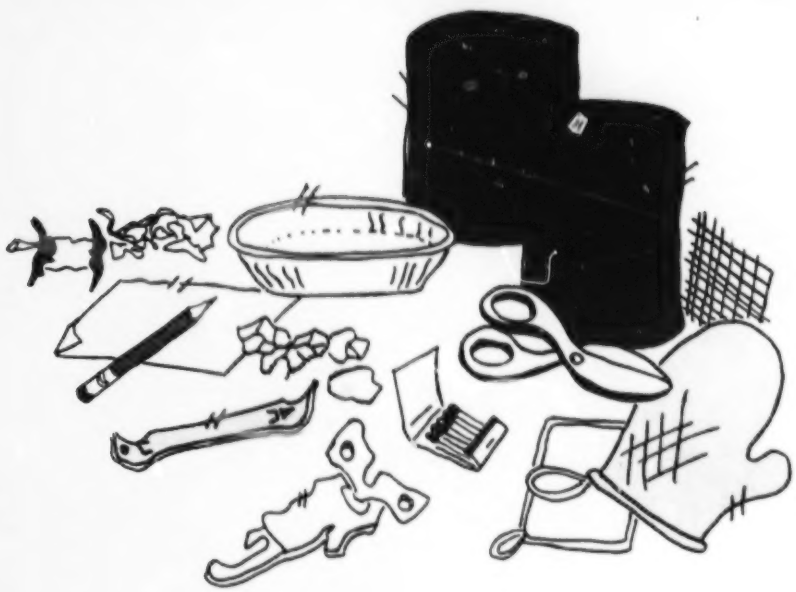
Participants will construct a mini-incinerator and try to incinerate various waste materials.

Kids this age: may not understand what a real incinerator looks like. It may be helpful to show a picture of one during the activity.

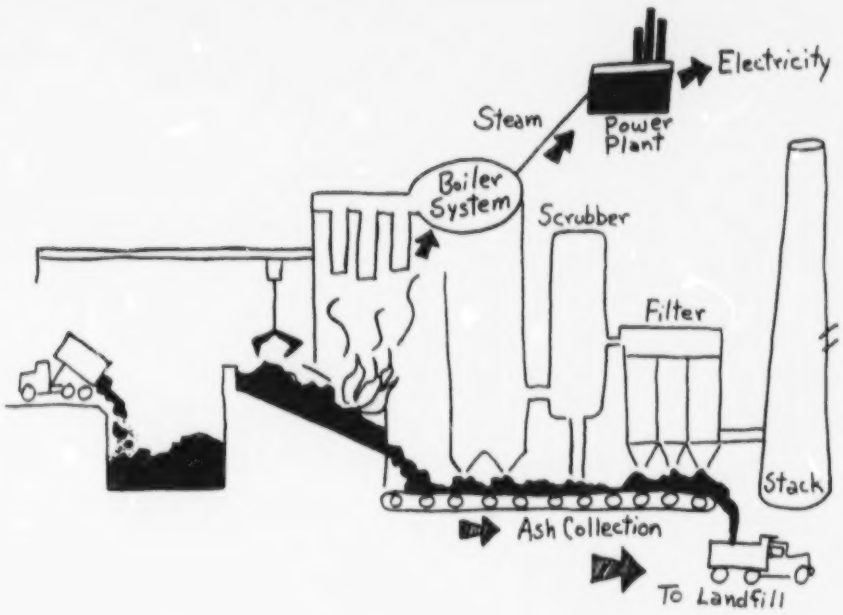
Time: 45-60 minutes

Materials:

Large can (coffee can or similar), can opener, aluminum pie plates, tin snips, bottle opener, window screening (or chicken wire), similarly-sized stones, various types of garbage (paper, food, plastic, metal, glass), matches, hot pads/hot mitts, paper, and pencils.



* Source: "Resource Recovery in North America," National Solid Wastes Management Association.



Experience:

1. Begin the activity with a few questions:

   What is an incinerator? (see definition in Glossary).

   What happens to items when they are burned or incinerated? Can all materials be burned?

2. Explain that some communities are using incinerators to dispose of their trash.

3. Tell the group they will be building mini-incinerators and burning various types of trash to see what happens to it.

4. Divide participants into groups of three or four. Assign one adult to each group. Have each group construct a mini-incinerator.

   a) Remove one end of a can. Using tin snips, cut out a U-shape along the rim.

   b) Using the bottle opener, punch two holes in the unopened end.

   c) Put the pie plate on cement, blacktop, or other non-burnable surface outdoors. Place the four stones in a square in the plate. The square should fit inside the can.

   d) Cut the screen (or double layers of chicken wire) to fit over the square. Place on the rocks. Place the tin can open-ended down over the screen inside the pie plate. Your "incinerator" is ready to go!

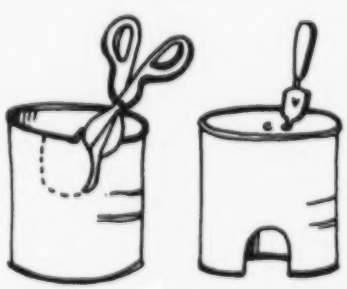
5. Have each group sort its trash into categories: paper, glass, plastics, metals, wood, and other. Place a layer or two of paper on the screen for each test.

6. Have each group remove the tin can. Place the paper down and add a layer of one type of garbage. Put the can back on the pie plate.

7. *Carefully* ignite the paper through the upside-down U-shaped door. Watch until the fire burns itself out, then *wait* a few minutes to allow the metal to cool. Wearing the baking mitts, remove the can.

8. For each type of material burned, record the following observations: type of trash, description of smoke, smell, ashes, and any other comments, such as: did it burn completely?

9. Keep in mind that an incinerator will burn hundreds of degrees hotter than your mini incinerator.



Reflection:

Discuss the following with the whole group:

1. What did you observe about each type of material? Which materials burned easily? Which materials did not burn at all? What type of smoke was produced? How much ash?
2. What are the benefits of incineration? (Answers: reduces the volume of solid waste to be disposed of, could produce energy).
3. What are some of the problems? (Answers: incinerators are expensive, some materials aren't burnable, ash needs to be placed in special landfills, some air pollution).
4. How could these problems affect you? (Answers: sickness, odors, landfills being filled).
5. Do you think incinerators are a good way to get rid of trash?
6. Some materials can't be incinerated, like glass and metal. What could you do with those materials, besides throwing them in a landfill?

Taking action:

At home

Talk with parents, brothers/sisters, and friends about what you've learned. Look through one day's solid waste from your home. What would happen to each item if incinerated? What else could you do with these items?

With our group

Demonstrate your mini-incinerator at school, youth meetings, or in your community. Eat a meal together at a fast-food restaurant. Collect all your trash from the meal and burn it in your incinerator. Which items are burnable? How much trash did your group have before and after incineration?

In our community

Identify where your solid waste goes. Is any of it incinerated? On a map find out where the nearest incinerator is located. Visit the site, if tours are available.

Adapted with permission from: "At Your Disposal," Ohio Cooperative Extension Service.

The Incredible Edible Landfill

Preparation:

Fun fact: Digging in old landfills, people have found 25-year-old newspapers that are still readable.

Key concepts:

Sanitary landfills are built to protect human health and the environment. They are expensive and complicated to build.

Objectives:

1. Learn how a sanitary landfill is built.
2. Learn why we must reduce the amount of waste going to landfills.

Method:

Build a replica of a landfill from everyday food items.

Kids this age: may not understand the purpose and need for every item in a landfill (leachate collectors, etc.). Keep it simple. Each item helps protect the environment and people.

Time: 45 minutes

Materials:

Edible landfill ingredients: chocolate pie crust, red licorice rope, graham cracker crust, chocolate pudding, vanilla pudding, coconut dyed with green food coloring.

For older youth, substitute a "non-edible" landfill: use an aluminum pan lined with clay, plastic bag to lay over the clay, straws (for collection tubes), sand or gravel, soil, and garbage (paper, plastic, metal, and glass).

Experience:

1. Begin the activity with a few questions—

   What happens to the garbage in your neighborhood?

   Where does it go after you throw it away?

2. Explain: Much of our solid waste is put into sanitary landfills. Sanitary landfills store garbage so it doesn't hurt the environment or people.
3. Explain: They will be building a model landfill. (Construct one landfill with the whole group, or with smaller groups of 4 or 5).

4. To build an *edible* landfill:

   a. Prepare vanilla and chocolate pudding, as directed on the package.

   b. To the vanilla pudding, add peanuts, raisins or other healthy foods to represent different garbage items.

   c. Prepare the graham cracker crust crumbs as directed, and separate into a large and small pile.

   d. Unwrap the chocolate pie crust and place it in a pie plate if not already in one. (The crust represents the clay liner that keeps liquids—leachate—from seeping through to the groundwater).

   e. Place some of the licorice across the pie crust (Tubes which collect and drain the leachate).

   f. Press the big pile of graham cracker crust crumbs over the licorice and up the sides of the crust (sand and gravel filter layer).

   g. Spread a *thin* layer of vanilla pudding in the bottom (first layer of solid waste).

   h. Cover the vanilla pudding with a *thin* layer of chocolate pudding (layer of soil to cover the solid waste).

   i. Repeat layers of vanilla and chocolate, ending with a chocolate layer.

   j. Cut red licorice rope into 2" lengths and insert vertically into the completed layers of vanilla and chocolate pudding (methane gas collectors, which remove the hazardous gas).

   k. Sprinkle green coconut over the top of the chocolate (planting grass on the final layer of soil).

Reflection:

Discuss the following with the whole group (if you created an edible landfill, discuss while the group is eating):

1. What do each of the food items represent? What purpose do they serve in the landfill?
2. What are some of the problems with burying solid waste in landfills? How could these problems affect you?
3. What happens to the garbage that is put in a landfill? (Answer: not much—without air and water, most garbage decomposes slowly, if at all).
4. Would you want a landfill near your home? Where is the closest landfill?
5. Landfills should be the last option to get rid of waste. What else could you do with your garbage?

Taking action:

At home

Share what you learned with a parent, older relative, or other adult. Construct a model landfill for your family, and explain what is involved in building a modern sanitary landfill.

With our group

Demonstrate this activity to other youth groups, a school class, or community group.

In our community

Investigate where your community's solid waste is disposed. Eventually some garbage is sent to a landfill. Where is your community's landfill? Could you visit and do a photo essay on the site?

At our current disposal rate, most Minnesota landfills will be filled by the mid-1990s. Is that true for your landfill? What is your community planning to do then?

Adapted with permission from: Community Recycling Center, 720 N. Market, Champaign, IL 61820.

Working on Waste: 4-H Efforts all over Minnesota

Clubs from Blue Earth, Marshall, Stevens, and Wadena counties participated in "Adopt A Highway" and "Adopt A River" projects.

Crow Wing County 4-H members created a float with the 3 Rs message for a local parade.

Martin County 4-H'ers conducted a Christmas tree recycling program.

Kittson County's Red River club set up an aluminum can recycling program in a local city park. They also provided pickup of recyclables for the elderly in their community.

Oslo Superstars in Marshall County held a "Reduce, Reuse, and Recycle" public awareness event with speakers, a video, demonstrations, and games.

Redwood County 4-H'ers distributed recycling bins for the county solid waste office.

Jack Pine Pals club in Clearwater County provided a 4-H recycling booth at their county fair; they obtained a grant to develop brochures for the booth.

Hubbard County 4-H'ers performed a musical called "Recycle Revue." Forty-two 4-H'ers from 13 counties in northwestern Minnesota performed a program called "Pollution Solutions."

4-H Clubs all over Minnesota are Working on Waste!

Trash Time Capsules

Preparation:

Fun fact: Americans use over 16 billion plastic containers a year.*

Key concepts:

Waste does not decompose easily in a landfill. What we throw into a landfill remains for future generations.

Objectives:

1. Learn how garbage has changed over time.
2. Learn how our waste habits affect the future.

Method:

Construct trash time capsules from used plastic containers.

Kids this age: are more focused on the present than the future. Try to personalize the future. What will they be doing when these time capsules are found?

Time: 20-30 minutes

Materials:

Paper, pencils, colored markers, masking tape, and plastic jars with lids.

Experience:

1. Begin the activity with a few questions:

   How is your life different from the lives of people who lived 100 years ago?

   What do you buy now that people didn't buy back then?

   How are products packaged now as compared to then?

2. Explain: A lot of things have changed since our grandparents were young, including the amount and types of things we buy and throw away.
3. Why is there more garbage now than 100 years ago? (Answer: more people, more packaging, more disposable products).
4. Much of our earlier packaging was made from renewable resources, like wood. How has that changed? Is there a problem with that change?
5. Where does our garbage go today? (Answer: 48% still goes to landfills).
6. What happens to garbage after it is put in a landfill? (Answer: with little air or moisture, garbage doesn't decompose; it just sits there).
7. Give each person a piece of paper, pencil or markers, and a plastic jar with a lid. Explain that each person is going to create a Trash Time Capsule.
8. Briefly describe what a time capsule is. (Answer: a container where messages are stored to be read by people many years later).
9. Have them write a letter that they or someone else might read in 60 years. What would be important to say about yourself? What special events are happening now? How do you feel about garbage right now? The message could be written or drawn; encourage youth to be creative.

* Source: "Recycling Study Guide," Wisconsin Department of Natural Resources.

10. Have each person sign and date their message and place it in the plastic jar. Label each jar "Trash Time Capsule."
11. Explain to the group that when plastic is thrown away, it takes a long time for it to decompose. In fact, we really don't know how long it takes—some guesses are 500 years or more!! Chances are good that you or someone else 60 years from now could find your time capsule in the landfill.
12. Have each person place his or her time capsule in an appropriate trash container.

Reflection:

Discuss the following with the whole group:

1. How did you feel about putting your time capsule in the trash? Throwing away garbage every day is very similar, isn't it? Why doesn't it bother us as much?
2. Garbage doesn't disappear. Do you think the garbage we throw away today will bother us sixty years from now? What will we do with our garbage then?
3. How much garbage will we throw away over the next sixty years? Where will all that garbage go?
4. Like our time capsules, garbage tells a story about the people who threw it away. What do you think our trash will tell people about us 100 years from now? 500 years from now?
5. Should we be leaving our garbage for future generations to worry about? What could be done about that situation? What could each one of us do?

Taking action:

At home

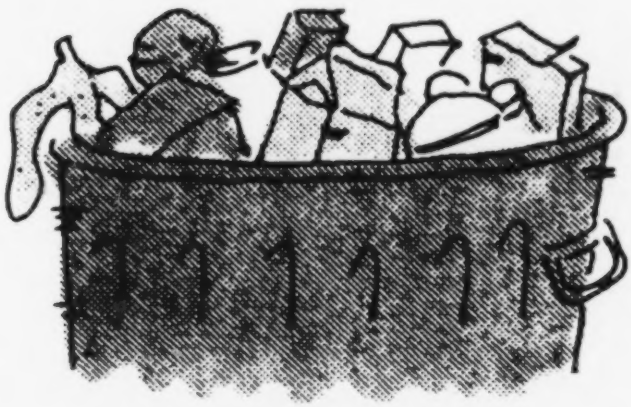
Have youth interview an older member of their family or a neighbor. Find out what garbage was like when they were young. What did they throw away? How were foods packaged? Ask them to tape record the interview or write a story about that person.

With our group

Have members evaluate ways that they, as a group, could reduce the garbage they produce. Conduct a "waste audit" of your group's activities. (See Action section of this guide for suggestions.)

In our community

Litter and illegal dumping are real problems for many communities. Are you aware of areas of your city (road ditches, vacant lots) that could be cleaned up? In the past, families sometimes threw garbage in their backyards. Could you help clean up these places?



NOTE: "Dr. Trash" would be a good video to accompany this activity. See Resource section of this guide.

Working on Waste: 4-H Efforts in Olmsted County

Olmsted County was the first county in Minnesota to establish "Adopt a Recycling Shed" programs for 4-H clubs, beginning in 1990. More than thirteen clubs in the county are now involved. The clubs are responsible for painting and maintaining the sheds. They also monitor the sheds for dumping problems, and have received training on recycling and waste reduction. They actively promote community awareness, developing brochures and providing door-to-door education for area residents. Many other counties, like Goodhue and Freeborn counties, have also taken on "Adopt a Recycling Shed" projects.

"By taking on these community service projects, 4-H members can be involved in important community issues and take an active role in finding solutions." Jann Wright, Olmsted County 4-H Agent.

Disposal Dilemma

Preparation:

Fun fact: On the average, it costs more than $5.5 million to build a new landfill.*

Key concepts:

Deciding what to do with a community's garbage is not easy. Decisions often result in compromises, not "perfect" solutions.

Objectives:

1. Understand the complexity of garbage problems.
2. Understand people's different opinions and concerns about solutions.

Method:

Through role-play, participants will try to solve a community waste problem.

Kids this age: may not be able to understand another person's point of view. Make it personal. Ask them, how would *you* feel if you were this person?

Time: 30-45 minutes

Materials:

Index cards, scratch paper, pencils, large sheets of paper or tagboard, markers, chairs, and a table. Set up the room with a head table and chairs facing front.

Experience:

1. Prepare by writing the opinion cards on separate index cards or copy and cut instructions on dotted lines (see next page).
2. Begin the activity with a few questions:

   Where does your community's garbage go?

   Who do you think decided where it would go?

   How do you think that decision was made?

   What concerns do you think were considered? (Answer: the environment, costs, people's opinions, health).
3. Explain: Deciding where a community's garbage is going to go is never easy.
4. Explain: We are going to use our imaginations for a few minutes. Let's pretend we are citizens of a make believe city called Pretty City, Minnesota. We need to decide where to build the city's new landfill.
5. Tape three large sheets of paper to a wall. Write one location on each sheet: Mrs. Rose's property, Farmer Jones' property, and Forest Grove. Make two columns under each location, titled "benefits" and "problems."
6. You will be playing the role of the mayor of Pretty City. Select six youth to play the role of citizens. (In a large group, you may assign two people to each role). Give each person his/her index card, a sheet of paper, and a pencil.
7. Allow them 5 to 10 minutes to read the description and write a short presentation to the mayor. Encourage them to be creative in acting their part.
8. Those not playing a role will be citizens at the meeting, and will vote after all opinions are heard.
9. As each person speaks, note on the large sheets of paper the benefits or problems related to each site.

* *Source: "Decision-Maker's Guide to Solid Waste Management,"* U.S. Environmental Protection Agency.

10. After all six have presented, lead a brief (10 minute) discussion. Where should the landfill be built? Strive for a compromise. It may be helpful to prioritize the benefits and problems (Example: does everyone think health concerns should come before costs?)

11. After the discussion, call for a vote (even if you have not reached agreement). The location with the most votes is selected.

12. Explain that this is a simplified version of how waste management decisions are made. Sometimes these decisions take years.

Card 1:

Dr. Clean—You are a scientist concerned about pollution from the landfill. You don't want it built on Farmer Jones' land, which is near the river. Nor do you want it on Mrs. Rose's land, where odors would reach Pretty City. You would like it built in Forest Grove.

Card 2:

Tom Hauler—You bring all of Pretty City's nonrecyclable garbage to the present landfill. You want the new landfill built on Mrs. Rose's property, because it is close to town and would save you money.

Card 3:

Lumberman Lewis—You cut trees in Forest Grove and sell them to the local paper mill. If the landfill is built in Forest Grove, you would have to close your business. You would like it built on Farmer Jones' land.

Card 4:

Molly Jones—You are Farmer Jones' 12-year-old daughter. You don't want the landfill built near your farm because it might harm your family's health. You want it built anywhere else.

Card 5:

Mrs. Rose —You are an elderly woman who owns land near Pretty City. You would like to sell your land, but you want a lot of money so you can retire and travel around the world.

Card 6:

Cindy Citizen—You are a Pretty City resident who works for Lumberman Lewis. You might lose your job if the landfill is built in Forest Grove. You also are concerned about odors in Pretty City if the landfill is built on Mrs. Rose's property.

Reflection:

1. How did you feel about the decision? Was it a good one?
2. What made this decision difficult? What helped make it easier? Could there have been other solutions you did not consider?
3. Would it be hard to be the mayor? Why?
5 Do you think your community must make difficult decisions about garbage, too?

Taking action:

At home

Ask an adult to help you review your community newspaper for articles on waste topics. Cut out these articles and paste them in a scrapbook. What are some of the problems and solutions your community has dealt with? How has that changed over time?

With our group

Appoint members to serve on an environmental committee to evaluate group activities and identify ways to reduce waste and other environmental problems.

In our community

Attend community government meetings to learn what the major environmental issues are. What process does your community go through to reach decisions?

Part III: TAKING ACTION

So far, this guide has provided background information and activities to build awareness of the solid waste issue. In this section we focus more specifically on actions that young people can take to solve solid waste problems:

- ❑ Ways to reduce, reuse, and recycle solid waste in club or class activities.
- ❑ Ways to integrate reduce, reuse and recycle themes and materials in young people's projects or areas of study.
- ❑ Ways to develop waste management community service projects.

By taking action, young people...

1. Learn new attitudes toward the environment.
2. Learn they can make a difference.
3. Play an important part in finding solutions to our solid waste problem.

TAKING ACTION. . . In Group Activities

Listed below are some ways your youth group or classroom might begin to reduce waste. As you plan your activities, incorporate new environmental habits. Starting small soon leads to big results!

- ❑ Have each person bring his/her own mug for refreshments. Try making individual or family "designer" mugs.
- ❑ Evaluate the types of treats or prizes you provide. Are they individually wrapped, bought in bulk, or naturally wrapped (i.e., oranges, bananas)? Do you use plastic plates or plastic wrap?
- ❑ Elect an environmental officer for your club. He/she can report on ways the club can reduce waste and can be in charge of environmental projects. Have the officer work towards your group becoming "environmentally friendly."
- ❑ Find out who your County Recycling Coordinator is and what he/she does. Invite this person to give a presentation to your group.
- ❑ Send correspondence on recycled paper. Set up a paper recycling box at each gathering. Collect old club newsletters. Find out where you can recycle this type of paper.
- ❑ Use recycled or reusable materials in your activities. Write on used paper or chalkboards. Conduct a waste audit of your activities and decide where you could reduce waste. Do activities produce laughs, fun, and smiles, but no waste?
- ❑ Reduce paper waste by removing family names from junk mail lists. To get off new mailing lists, write to The Direct Marketing Association, 6 East 43rd St., New York, NY 10017. To get off current mailing lists, write or call the companies directly.
- ❑ Set up an exchange table for reusable items: clothing you've outgrown, games, books, and other articles you no longer want or need.
- ❑ Use environmental games and activities at club gatherings. Have recreation leaders adapt their favorite game to give it an environmental focus. Play games that don't need disposables.
- ❑ Have each person evaluate his/her projects or demonstration ideas for ways to integrate waste management themes or materials. (Use suggested integration ideas in this section).
- ❑ Have each person draw up a contract listing three actions he/she will take to reduce waste. Have youth list how often they will do the actions, and when they will be completed. Each person should sign the contract and review it regularly.
- ❑ Select a community service project on an environmental issue (see suggested projects in this section). Choose one that gives youth a voice in making community decisions and that will take place over several months or more.
- ❑ Brainstorm other ways to incorporate environmental activities into your club program. See how attitudes and habits change.

Yes, you can make a difference!

TAKING ACTION. . . In Individual Projects

Young people receive several benefits as they discover ways to integrate waste management topics into other projects or areas of study:

1. They become more conscious of their own environmental attitudes and habits. This usually leads to more environmentally sound behaviors and lifestyles.
2. By discussing and brainstorming these ideas, young people begin to realize that waste management is an issue that is affected by all areas of their life.
3. They can create exhibits to build public awareness about the issue.

This section on project integration will emphasize the 3 Rs—

- ❑ *Reduce* the amount of waste generated
- ❑ *Reuse* things rather than throw away or buy new
- ❑ *Recycle* some resources back into similar new products or other new products

To get started, ask your young people to work through the activity called "Reducing Waste—In Any Project," on page 21, then apply it to their specific project interests.

You can integrate waste management topics into youth projects through the project's theme, the materials used, or the way you dispose of project wastes.

Although these are the project areas of Minnesota 4-H Youth Development, you can easily use many of the ideas with classroom projects or other youth programs.

This list is not comprehensive. It's a starting point for generating your own ideas.

Animal Sciences

Large Animals

- ❑ Plan innovative ways to manage animal waste for a livestock operation, with minimal environmental impact.
- ❑ Evaluate your waste management practices and the ways you use the 3 Rs in your farm or operation.
- ❑ Identify hazardous substances in animal production, such as materials used in cleaning dairy equipment. What are proper alternatives, uses, storage, and disposal?
- ❑ Find out what steps are involved in meat processing. At what points are wastes produced, and how are they disposed of? How could wastes be reduced?
- ❑ Try using newspaper as bedding for large pets, such as horses.

Small Animals

- ❑ Study and display proper animal waste procedures.
- ❑ Make pet housing and equipment from recycled materials (pet toys, feeders, etc.).
- ❑ Study the hazards in our home environment and how they affect animal health.

Expressive Arts

Creative Arts

- ❑ Create a weaving, sculpture, or other "piece" using all reused/recycled material.
- ❑ Learn how natural fibers (wood, cotton, etc.) are recycled into paper. Make paper and use it in an art project (design some cards or jewelry, make picture frames of different textures or shapes, etc.).
- ❑ Express an environmental theme or message in your work.
- ❑ Design your work using media materials that reflect the theme.
- ❑ Design logos or graphics for a community recycling program or other project.
- ❑ Study the hazardous materials used in creative arts projects (paint, cleaners, etc.). What are the hazards, safe use, proper storage, and disposal issues?

Photography

- ❑ Learn about the chemicals used in developing film and how they can be disposed of and recycled safely.
- ❑ Set up a program or campaign to recycle film canisters or camera batteries.
- ❑ Use a photo story to show steps in a recycling process or to show a community composting site.
- ❑ Produce a video about a 3 Rs topic.

Performing Arts

- ❑ Make recycled instruments and costumes.
- ❑ Plan a production that incorporates the 3 Rs. (The drama could have an environmental message; recycled/reused materials could be used for staging and costumes; or programs could be printed on recycled paper and collected and recycled after the performance).
- ❑ Create a clown character around a 3 Rs message.

Home Economics

Child and Family Development

- ❑ Make toys from recycled/reused material.
- ❑ Write a children's book about the environment, made from recycled/reused materials.
- ❑ Design a game to teach children about recycling.
- ❑ Make a children's display about household hazardous wastes, showing how to properly store and dispose of them.
- ❑ Write a plan for a business that sells or exchanges children's toys and clothing.
- ❑ Design a kids' calendar to teach dates and 3 Rs topics.

Clothing and Textiles

- ❑ Construct clothing from reused/recycled material.
- ❑ Set up a community service project to exchange or collect reusable clothing.
- ❑ Study and display the environmental effects of cleaning fabrics and clothing (detergents, bleach, dry cleaning).
- ❑ Design or collect accessories that are made from reused/recycled materials or have an environmental theme.
- ❑ Create a county fashion show with an environmental theme (Example: "Attitudes for the Future," reflected in clothing and a 3 Rs lifestyle).

Consumer Education

- ❑ Compare products from a 3 Rs standpoint. Look at packaging, waste production and alternatives.
- ❑ Study and display ads for products that use an environmental theme. Are the companies using this theme for marketing?
- ❑ Study types and uses of recyclable items. Conduct a community service project on labeling recyclable store items.
- ❑ Study and make a display showing the lifecycle of a consumer product, from basic resource through disposal.
- ❑ Invent alternative packaging for products that are now overpackaged.

Food and Nutrition

- ❑ Plan two meals with the same menu, one using products with minimum packaging, the other using products that are over-packaged (Example: fresh oranges versus three oranges wrapped in plastic). Compare wastes resulting from the meals.
- ❑ Study and display the impacts of pest control (pesticides) on food production.
- ❑ Compare waste production of bulk versus single-serving packaged food.
- ❑ Explore the energy used, wastes produced, and cost of a food item purchased in different forms (fresh, frozen, canned, dried).
- ❑ Prepare an environmentally sound dinner including food preparation, serving, and clean-up. Consider all energy and waste.

Food Preservation

- ❑ Study and calculate energy costs of home food preservation versus commercial preservation.
- ❑ Study and make an exhibit about the pesticides used to produce the product you preserve. What are the potential food safety issues?
- ❑ Study and make a display about the disposal of byproducts of home food preservation (such as composting). What biological processes take place in the breakdown of these materials? Is that similar to what happens when food is spoiled because of poor preservation techniques?

Home Environment

- ❑ Design a waste management system for a home, including a recycling center.
- ❑ Use reused/recycled fabric to make a quilt. Find other uses for reused/recycled items in decorating a room.
- ❑ What products are used in refinishing or finishing furniture? Which are hazardous wastes? What steps should be followed for safe use and for disposal with minimal environmental impact?
- ❑ Create a system for auditing household hazardous waste. Explain proper use, alternatives, storage, and disposal.
- ❑ Include in any room design plan a section on hazardous and other wastes. Demonstrate proper procedures for disposal.
- ❑ Make a display comparing past and present home waste disposal methods and types of wastes generated.
- ❑ Plan a community service project to establish or assist with a household hazardous waste collection program.

Needle Arts

- ❑ Construct a quilt of recycled/reused fabric.
- ❑ Study dye processes for fabric and yarns. What are the waste products? Are they hazardous? How are they disposed of?
- ❑ Design a stitchery piece with a 3 Rs message.
- ❑ Compare the environmental impacts of natural versus synthetic fabrics, threads, and yarns.
- ❑ Design a needle arts project using waste yarn and thread pieces.

Mechanical Sciences

Aerospace

- ❑ Study flight and gliders. Make several different glider styles using recycled plastic or paper containers.
- ❑ Do an audit of the materials used in constructing a rocket or plane model (glues, paint, etc.). Are these hazardous wastes? How are they safely stored, used, and disposed of?
- ❑ Design a model from reused and recycled materials (aluminum cans, old wood, etc.).

Bicycle

- ❑ Study the potential for reused bike parts. How are old bikes disposed of?
- ❑ Calculate advantages of bike versus motor vehicle use by charting miles ridden and comparing fuel and air pollutants.
- ❑ Make a display showing how to dispose of old bike tires.

Computers

- ❑ Design a software game on the 3 Rs.
- ❑ Design a program to calculate waste, using a database, spreadsheet, graphics, etc.
- ❑ Set up a recycling program for computer paper and cartridges in your school or community.
- ❑ Study what happens to outdated or broken computers. Which parts are recycled? What happens to the other parts?

Electric

- ❑ Construct an electrical experiment or project made from recycled materials.
- ❑ For a fair project, create a lighted question board using recycling as a theme.
- ❑ Study and make a display of batteries used as a source of electricity. Why are some materials used in batteries hazardous? Establish or assist with a battery recycling program in your community.

Small Engines/Tractors

- ❑ Design an engine and piece of equipment for recycling (i.e., can crusher, mulcher, wood chipper).
- ❑ Conduct a community survey of waste oil disposal sites. Conduct a campaign to encourage proper disposal of small engine waste oil.
- ❑ What hazardous wastes (fluids, cleaners, solvents, etc.) are used in a small engines shop? What are their hazards and the proper disposal methods?
- ❑ Construct/repair an engine using recycled parts.

Natural Resources

Entomology

- ❑ Study and display insects that are used to determine oxygen levels in streams as part of water quality monitoring.
- ❑ Develop a plan for integrated management of one insect pest.
- ❑ Display insects that help decompose yard waste.
- ❑ Study and display the 3 Rs in chemical pest control. What are the hazardous wastes? What are the appropriate and inappropriate uses, storage, and disposal of these wastes?
- ❑ Study and display insects that are beneficial in food production. How can you support these populations? What are the benefits and limitations?

Fishing Sports

- ❑ Study water quality issues related to fish populations in Minnesota. What are water contaminants? How do they get into water? What are the solutions?
- ❑ Make fishing equipment from reused and recycled materials.
- ❑ Set up a fish waste composting or disposal system.

Forest Resources

- ❑ Conduct a community service project on Christmas tree recycling.
- ❑ Set up a display showing wood resources for the paper product industry. Include trees and recycled paper.
- ❑ Develop a display showing the complete cycle of forest resources. Start with a tree and follow the cycle through production of a wood product (including the waste generated) to final decomposition.

Geology

- ❑ Display soil and rock formations that make a site appropriate or inappropriate for landfills.
- ❑ Study and display ores used for various consumer products. What are world quantities? What effect does recycling have on natural ore supplies?

Shooting Sports/Wildlife Management

- ❑ Study and exhibit our current waste disposal methods and their effects on wildlife (Examples: animal dependence on garbage for food, effect of styrofoam cups on whale populations).
- ❑ Clean up a nature trail, wildlife area, or river. Sort and recycle appropriate waste.

Wood Science/Shop

- ❑ Design and build something with recycled plastic building materials. What are the benefits and limitations?
- ❑ Design and build a waste management center for home, community, or school (recycling bins for your home, recycling shed for your community).
- ❑ Study and display the complete cycle of a forest product from tree to lumber production, waste products, finished product, decomposition of product, and back to tree.
- ❑ Study and display hazardous waste materials used in wood product production (paints, glues, etc.). Discuss the 3 Rs in terms of quantity purchased, storage, use, and disposal.

Personal Growth and Development

Citizenship/International

- ❑ Interview parents and grandparents about waste. How were products packaged and disposed of in the past? How is that different today? What can we learn from and/or change with this information?
- ❑ Develop a plan for an environmental project with your club and/or community. Who needs to be involved? How do decisions get made? What can you do to get your issue implemented?
- ❑ Get involved in your community with waste management. Talk to your county solid waste officer. Sit in on county board or committee meetings when solid waste issues are discussed. Make a display of the public issues and how they have been addressed.
- ❑ Study and exhibit some global aspect of solid waste. How do other countries dispose of waste? What effect does American use and disposal of products and resources have on other countries?

Health

- ❑ Study household hazardous wastes—their proper storage, use, and disposal. What are the alternatives?
- ❑ Explore the use and disposal of medical products. What are the issues and solutions?
- ❑ How do toxins in waste and water affect humans?

Leadership

- ❑ Serve as a junior leader to teach the 3 Rs to club members. Develop a lesson notebook.
- ❑ Lead a community pride project on solid waste. Document your involvement.
- ❑ Develop a file of games, songs, and skits that you've adapted for a 3R focus. What resources did you use to insure that the information is accurate?

Plant Sciences

Crop Science/Plant and Soils

- ❑ Study and display the lifecycle of a pesticide used in crop products. Highlight potential hazards, safe use, and disposal.
- ❑ Study and display the effects of different types of composted wastes on soils and plant growth.
- ❑ Establish or help with a project to collect pesticide containers.
- ❑ Study how sustainable agriculture relates to the 3 Rs.
- ❑ Use compost on your garden.

Flower, Indoor, Fruit and Vegetable Gardening

- ❑ Use reused/recycled materials for planters and vases.
- ❑ Study and display hazardous wastes from gardening. What are some alternative uses, proper storage, safety factors, and control?
- ❑ Study and display advantages and disadvantages of "organic" gardening.
- ❑ Design a display of composting and its use in gardening. What are the benefits?

Lawn and Landscape Design

- ❑ Study and display techniques to reduce yard waste.
- ❑ Make a display of appropriate composting techniques for a back yard.
- ❑ Design a landscape plan focusing on environmental issues (plantings to reduce energy use, composting and recycling sites, edging and construction materials that are reused/recycled, etc.).
- ❑ Use recycled products for landscaping.

TAKING ACTION. . . In Your Community

By taking action, individually and as a group, young people can have a great impact on solving community environmental problems. Throughout this guide, you have seen case studies, examples of service projects being done by 4-H youth. Could your group do a similar service project?

To tackle a community problem or issue, you'll need a well-thought-out plan and involvement and cooperation from many people. Regardless of how big or small the project is, you'll need to follow some important steps.

Step One: Brainstorming for Action

1. Brainstorm a list of issues and concerns about solid waste in your community.
2. Generate a dream list of what could be done.
3. Identify why this is an issue and what barriers keep it from being solved.
4. Brainstorm solutions to those barriers in order to fulfill your dream list.
5. Identify the people or groups (audience) who are affected by the issue and its solution, and get them involved.

Below is an example of Step One:

Issue: No recycling at your school

Dream List:

1. Recycling pop cans
2. Reducing lunchroom waste
3. Reducing and recycling paper
4. Composting school yard waste
5. Buying recycled paper and envelopes

Barriers:

1. Principal doesn't support recycling.
2. No system set up for collecting recyclables.
3. No way to get recyclables to a recycling center.
4. No place set up for composting.

Solutions:

1. Have principal serve on reduction and recycling committee.
2. Call to make sure there is a market for your recyclables.
3. Hire local recycler to collect materials.
4. Set up recycling bins.
5. Promote program in the schools.
6. Look into getting returnable milk containers.
7. Look into using washable dishware, if not already doing so.
8. Set up a composting bin near the cafeteria.
9. Look into purchasing recycled products through the Minnesota Cooperative Purchasing Contractor.

Those affected:

1. School administrators
2. School support staff (custodians, grounds crew, purchasing agent)
3. Students and teachers
4. School board

Step Two: Creating an Action Plan

Once you've identified a solid waste project that interests your group and can be done within your allotted time and resources, then create an action plan. You should be able to write out and explain each of the components below:

1. Objective (what we want to accomplish):
2. Reasons for project:
3. Audience:
4. People who will need to be involved:
5. Who will do what:
6. Timeline (dates and target points) of things we need to do:
7. Costs and sources of money or other resources:
8. How we will know when it's a success:
9. How we will provide recognition for everyone involved:

Step Three: Evaluating our Action

Evaluation shows whether you accomplished what you set out to do. It also gives participants an opportunity to discuss the project and what it
has meant to them. Here are some important questions to guide your evaluation process:

1. What we planned to do:
2. What we did:
3. What impact it had on our community:
4. What impact it had on the individuals involved:

Note: Be sure to support your effort and provide recognition by getting newspaper and media coverage, handing out certificates, etc.

Community Service Ideas

Each community has unique waste management issues and community service opportunities. This list shows some ideas to begin your brainstorming process. Some of the examples may not work in your community, but they may suggest other workable ideas.

Littering

- Clean up a river or stream (Contact the DNR Adopt a Stream Program).
- Clean up a highway (Contact MDOT Adopt a Highway Program).
- Clean up a city park or neighborhood vacant lot.
- Design and paint litter barrels for public areas.
- Produce a video documentary on litter in your community.
- Write and present a play on litter.
- Raise money to purchase "no littering" signs for roadsides, community parks, etc.
- Pick up litter in your township/city—sort and recycle what you can.

Reducing

- Volunteer at a community household hazardous waste collection program.
- Help distribute leftover restaurant food to persons in need.
- Place stickers on recyclable or recycled packaging at a grocery store.
- Provide presentations on ways to reduce waste at home, school or office.
- Sponsor a waste reduction poster contest for youth in your county or school.
- Design a waste information booth for community events or county fairs.
- Teach about waste at day care centers.
- Develop informational posters and displays for local stores.
- Sponsor community informational meetings on waste management.
- Conduct a public awareness campaign on ways to reduce waste.
- Develop radio public service announcements on waste reduction.
- Write newspaper articles or a community newsletter on waste reduction.
- Make cloth bags for shopping and lunch bags. Sell or give away.

Reusing

- Volunteer your time at a clothing exchange.
- Set up an exchange program at your school or community center.
- Hold a community rummage sale or group garage sale.
- Distribute magazines or used books to nursing homes, libraries, etc.
- Make quilts from reused fabric. Donate to the needy.
- Reuse greeting cards and magazine pictures to make valentines and other cards for elderly.
- Hold a craft sale of items made from reused materials.
- Provide a presentation of used toys and games at your school.

- Construct a float for a community or county parade using reused materials.
- Collect and repair old tools, toys, and lawn furniture.
- Construct a community playground from reused materials (i.e., tires).
- Make wildlife habitat from old Christmas trees.

Recycling

- Help build or adopt a community recycling shed.
- Establish a household battery collection program.
- Help distribute curbside recycling bins.
- Collect recyclables at community campgrounds or community events. Maintain recycling bins.
- Assist in the recycling of used pesticide containers.
- Distribute recycling flyers at parades and community events.
- Hold an old time recycling event or recycling festival.
- Design a brochure with information on recycling special wastes (i.e., tires, batteries, appliances, etc.).
- Collect recyclables for the elderly.
- Construct recycling bins for libraries, community centers, schools, homes.
- Establish recycling programs in community buildings.
- Sponsor an open house for a new recycling center.
- Conduct a community recycling survey. Publicize the results.

Composting

- Construct demonstration compost bins—display in community.
- Help develop a community yard waste compost site.
- Volunteer at a community yard waste compost site.
- Collect yard waste for the elderly.
- Build and sell compost bins.
- Survey neighbors to find out if they compost or mulch. Encourage them to.
- Organize a Christmas tree recycling program.
- Design brochures on yard waste composting.
- Provide demonstrations of proper mulching and composting techniques.
- Conduct demonstration compost plots (compost with and without soil, etc.).

Part IV: Waste Education Resources

Major Organizational Resources

Minnesota Extension Service (MES)

Materials listed below as (MES) are available from the Minnesota Extension Service, Distribution Center, 3 Coffey Hall, 1420 Eckles Avenue, University of Minnesota, St. Paul, MN 55108, (612) 625-8173.

Minnesota Office of Waste Management (OWM)

Materials listed below as (OWM) are available from the Waste Education Clearinghouse, Office of Waste Management, 1350 Energy Lane, St. Paul, MN 55108, (612) 649-5482 or 1-800-877-6300 (Minnesota only).

Minnesota Pollution Control Agency (MPCA)

Materials listed below as (MPCA) are available from the Minnesota Pollution Control Agency, 520 Lafayette Road, St. Paul, MN 55155, (612) 296-6300 or 1-800-652-9747.

Other Agencies and Organizations

The Aluminum Association, 818 Connecticut Ave. N.W., Washington, DC 20006.

American Paper Institute, 260 Madison Ave., New York, NY 10016.

Glass Packaging Institute, 1133 20th St., N.W., Rm. 321, Washington, DC 20006.

GRCDA/Solid Waste Association of North America, P.O. Box 7219, Silver Spring, MD 20910 (301) 585-2898.

Institute of Scrap Recycling Industries, 1627 K St. N.W., Washington, DC 20006.

Keep America Beautiful, 9 W. Broad Street, Stamford, CT 06902.

National Solid Waste Management Association, 1120 Connecticut Ave. N.W., Washington, DC 20005.

U.S. Environmental Protection Agency, 401 M St. S.W., Washington, DC 20460; Region V Office (Minnesota is in Region V), (312) 353-4686.

Resource People and Facilities

Minnesota Extension Service Agents. Many county agents have expertise in waste management issues, or may know of others in your county that can help you. They are a good first contact.

Recycling Coordinators. Many Minnesota communities have a recycling coordinator who may be available for both technical and educational assistance. Contact your city hall.

Solid Waste Officers. Each county in Minnesota has a solid waste officer, to coordinate and plan for solid waste management. Contact your county office or the Minnesota Office of Waste Management.

Local Sanitation or Recycling Companies. Many garbage haulers and recycling companies can provide information, group presentations, or tours. Check your local business directories.

Listing of Minnesota Recycling and Waste Processing Facilities which can be toured. (OWM)

Curriculum, Posters, and Games

Community Cats: Grade 3, Minnesota curriculum with teacher's guide and lessons. Minnesota Curriculum Services Center at 1-800-652-9024 or (612) 483-4442.

Environmental Jeopardy game, Dow Chemical Company (800) 441-4369.

Household Hazardous Waste Learning Stations. (MPCA)

Let's Reduce and Recycle: Curriculum for Solid Waste Awareness, U.S. EPA RCRA/Superfund Hotline (800) 424-9346 or (OWM).

Nature's Recyclers, Wisconsin DNR guide for naturalists. (OWM)

Oscar's Options I & II. Rhode Island curriculum, grades 4-8. (OWM).

Recycling Study Guide. Activity guides for grades K-3, 4-12. (OWM).

Re: Thinking Recycling. Curriculum for grades K-12 (OWM).

Project Wild/Project Learning Tree, Minnesota Department of Natural Resources, (612) 296-6157.

Toxics in My Home? You Bet! Grade 4-6, 7-8, 9-12. Curriculum on household hazardous waste. (OWM)

Periodicals

Biocycle, J.G. Press, Inc., Box 351, Emmaus, PA, 18049, (212) 967-4135. Composting information.

Garbage, Old House Journal Corp., 435 Ninth Street, Brooklyn, NY 11215, (718) 788-1700. General information on solid waste.

Resource Recycling, Resource Recycling, Inc., PO Box 10540, Portland, OR 97210, (503) 227-1319.

Waste Age, NSWMA, Suite 100, 1730 Rhode Island Ave., NW, Washington, DC 20036, (202) 659-4613.

Books

Available at your local library or bookstore.

Coltharpe, B. *Mr. Rumples Recycles.* Baton Rouge, LA: Hyacinth House, 1989.

Dr. Seuss. *The Lorax.* New York, NY: Random House, 1971.

EarthWorks Group. *50 Simple Things Kids Can Do to Save the Earth,* and *The Recycler's Handbook: Simple Things that You Can Do.* Kansas City, MO: Andrews and McMeel, 1990.

Silverstein, Shel. "Sarah Cynthia Sylvia Stout Would Not Take the Garbage Out", *Where the Sidewalk Ends,* Harper & Row Publishers, Inc. 1974.

Wilcox, C. *Trash.* Minneapolis, MN: Carolrhoda Books, Inc., 1989.

Audio Visual Materials

"Aluman the Can," VHS, 15 minutes. Preschool-2nd grade. An aluminum can in search of where it belongs. (OWM)

"Dr. Trash," VHS, 10 minutes. Saturday night program with Connie Chung. (OWM)

"I Need the Earth, and the Earth Needs Me," 20 minutes. Focuses on things we can do for the Earth. (OWM)

"It's Up to Us," 29 minutes. A small boy examines Minnesota's solid waste problem. (OWM)

"The Lorax," VHS, 24 minutes. Animated Dr. Seuss story—good introduction to environmental issues. University of Minnesota Film and Video, (612) 627-4270.

"Mister Rogers' Neighborhood," VHS, 30 minutes, Preschool. (OWM)

"Reduce, Reuse, Recycle: It's Elementary," 19 minutes. Presentation to elementary children on the 3 Rs. (OWM)

"Rock 'n Roll Recycling," 24 minute music video, Dow Chemical Company (800) 441-4369.

"The Rotten Truth," VHS, 30 minutes, Grade 4-6. (OWM)

"Save the Earth: How to Start at Home," 23 minutes. (OWM or MPCA)

Part V: Glossary

Aluminum—a light metal made from bauxite ore.

Composting—the breakdown of organic matter by microorganisms to produce a soil-like material called humus.

Curbside collection—setting recyclables at the curb for pickup.

Dropoff box—receptacle located in a community, where recyclables can be taken.

Dump—an illegal, open site for the deposit of waste materials.

Energy recovery—the burning of solid wastes to produce energy or fuel.

Garbage—another word for solid waste, especially household waste.

Groundwater—water below the earth's surface that supplies wells and springs.

Hazardous waste—waste materials that are dangerous to living things or to the environment.

Incinerator—a machine or facility used to burn garbage.

Leachate—a liquid formed when water seeps through garbage or compost.

Litter—waste thrown in the wrong place.

Materials recovery facility (MRF)—a facility that sorts, separates, and processes recyclable materials.

Methane—a colorless, odorless, flammable gas formed by the breakdown of waste.

Monofill—a landfill specially designed for incinerator ash.

Municipal solid waste (MSW)—nonhazardous waste from households, commercial and industrial sites.

Nonrenewable resource—a raw material that cannot be replaced by nature in a relatively short period of time.

Organic—derived from living organisms.

Plastic—petroleum or oil-based products that are chemically changed into solid form.

Recycle—to collect, process, and market materials so that they can be used again.

Renewable resource—a natural resource derived from an endless or cyclical source (i.e., wood, cotton).

Reuse—to extend the life of an item by using it again, repairing it, modifying it, or creating new uses for it.

Sanitary landfill—a specially engineered site for disposing of solid waste.

Solid waste—all solid and semisolid waste, including industrial, construction, and household wastes.

Solid waste management—the handling, processing, and disposal of all solid waste.

Source separation—sorting recyclable materials into specific types, by the person who last uses the materials.

Transfer station—a holding facility where waste is reloaded into large trucks for transportation to landfills or recycling dealers.

Waste source reduction—lessening the amount of waste generated.

Yard waste—garbage generated from grass clippings, branches, and leaves.

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